DOCUMENT RESUME

ED 147 160 SE 023 338

TITLE	National Environmental/Energy Workforce Assessment for Vermont.
INSTITUTION	National Field Research Center Inc., Iowa City, Iowa.
SPONS AGENCY	Environmental Protection Agency, Washington, D. C.
PUB DATE	77
GRANT	EPA-T-900591010
NOTE	137p.; For related documents, see SE 023 292-360; Contains occasional colored pages
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	Air Pollution Control; *Career Opportunities; *Educational Programs; Energy; Environment; *Manpower Needs; Pesticides; *Pollution; Post Secondary Education; Radiation; *State Legislation; Water Pollution Control
IDENTIFIERS	Noise; Solid Wastes; *Vermont

ABSTRACT

This report presents existing workforce levels, training programs and career potentials and develops staffing level projections (1976-1982) based on available information for the State of Vermont. The study concerns itself with the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, wastewater, and energy. The format includes workforce profiles, projections, growth and career options for each of the areas investigated. Additional sections of the report outline state legislation and selected post secondary institutions with formal Environmental/Energy programs. A state profile and summary is included for cross-reference. The selected bibliography is appended in the Region I report. This document is one in a series of 69 which presents information for each of the states, Washington, D.C., Puerto Rico, and the Virgin Islands, and national and regional summaries. (CS)

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ED147160

A National Environmental/Energy Workforce Assessment

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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SE 023 338

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

VERMONT

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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INTRODUCTORY NOTE

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ACKNOWLEDGEMENT

Valuable support and assistance for this report was provided by the Agency of Environmental Conservation and the Vermont Department of Health. Appreciation is extended to Mr. Martin Johnson of the Agency for providing an overview of the state environmental pollution control efforts. Also within the Agency of Environmental Conservation, Mr. Gordon Pyper, of the Department of Water Resources, was particularly helpful in describing Vermont's water quality engineering support program.

Mr. James F. Agan, Mr. William Brierly, Ms. Marilyn Premont, and Mr. Tom Nesbitt of the Division of Environmental Engineering were very helpful in providing information describing the Vermont wastewater pollution control effort. Mr. Will Kelley of the Division of Plant Pesticide Control explained the pesticide regulatory program which is currently involved in training activities to comply with federal legislation. Mr. Richard Valentinetti of the Air and Solid Waste Programs was very helpful in providing information on the air pollution control and solid waste management programs.

Mr. Paul Clemens of the Department of Health, Division of Occupational Health, contributed insights concerning both radiation and noise control programs in Vermont. Mr. Ken Stone, also of the Vermont Department of Health, was particularly helpful in providing information concerning water supply program activities for compliance with the Federal Safe Drinking Water Act.

PREFACE

This report presents existing workforce levels, training programs and career potentials and develops staffing level projections (1976-1981) based on available information for the State of Vermont in the environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, wastewater and energy. This study was carried out for the United State Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for Vermont. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily based on best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air

Noise

Pesticides

Potable Water

Radiation

Solid Waste

Wastewater

Energy

National Environmental Energy Workforce Assessment

Phase I

VERMONT

State Summary

I. AIR

Vermont's air pollution control program is functionally located within the Division of Engineering of the Agency of Environmental Conservation. Fifteen persons currently staff the air pollution control program in Vermont. The program is staffed by engineers, technicians, air pollution control specialists, a chart reader, and secretaries. Serious consideration is being given to a reevaluation of program objectives and commitments in an effort to make a realistic determination of the future direction of the program.

Career potential in air pollution control in Vermont is expected to be limited over the next five years. As the state government is the primary employer of full-time professionals and it is anticipated that the state will not hire additional personnel because of fiscal constraints, the development of careers in this field appears to be limited. However, if adequate funding does become available, Vermont's air program has estimated that approximately five person-years will be needed to adequately staff all new program directions which have been suggested by EPA.

II. NOISE

Vermont has not enacted any statewide noise control legislation as of yet. For any matters relating to noise control problems, the Division of Industrial Hygiene of the State Department of Health has been designated as the principal contact agency in Vermont to have noise pollution problems referred to it. Their principal activities consist of responding to citizen complaints and assisting parties involved to settle any disputes through arbitration.

Unless new federal initiatives are provided, it is considered unlikely by state officials that Vermont will create a formal noise control program or capability by 1982, since noise is not considered to be a significant problem.

III. PESTICIDES

The Vermont Department of Agriculture has been designated as the state lead agency for the administration of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended. The Department's Division of Plant Pest Control has program responsibility to carry out the pesticide regulatory and certification program. The Vermont Pesticide Advisory Council and the Vermont Extension Service of the University of Vermont have also been designated as cooperating agencies with the Department.

The Department's pesticide staff currently is composed of entomologists, a pathologist, field agents, and secretaries. No growth projections are currently available from program staff as it is uncertain how many restricted use pesticides will have to be regulated.

Growth in the numbers of commercial applicators will approach 325 when the certification effort is completed in the latter part of 1977. As for private applicators, it is estimated that if the restricted use list includes certain dairy pesticides not currently restricted, then about 90% of all dairy farmers will have to be certified.

IV. POTABLE WATER

Drinking water quality in the state of Vermont is regulated by both the Agency of Human Resources (AHS) and the Agency of Environmental Conservation (AEC), with the latter considered the lead agency. AEC's function involves the construction of municipal water treatment facilities. AHS is concerned with ensuring all health and hygiene aspects of public drinking water in the state and is the state's primary agency for implementation of all provisions of the Safe Drinking Water Act (SDWA) of 1974. The state has accepted the first year's role in primacy and is evaluating the possibility of accepting full primacy under the Act. The 400 community water systems in the state should be substantially upgraded under SDWA through joint cooperation between EPA and AHS.

AEC's water supply program is staffed with two environmental engineers, whereas AHS is staffed with civil and sanitary engineers, sanitarians who serve as field inspectors, and a chemist. The AHS water supply program has full-time laboratory analytical capabilities from its staff of chemists and microbiologists.

If the state assumes primacy under SDWA, it has been estimated that the program will need about four more people to ensure adequate operation. Specific growth through 1981 will be totally dependent on financial assistance available from EPA under SDWA.

V. RADIATION

Environmental radiation control in the State of Vermont is the responsibility of the Division of Occupational Health of the Vermont Department of Health. The program is primarily directed toward surveillance around the site of the Vermont Yankee Nuclear Power Plant in Vernon, Vermont, but also includes several sampling points in other parts of the state to provide background (baseline) information for comparison purposes.

The radiation control program is staffed with a director, a radiological health specialist, laboratory chemist, and a laboratory technician. In the private sector, Vermont Yankee represents the only nuclear power generating installation in the state. It has been estimated that 213 person-years of technical and professional work are spent on environmental monitoring and analysis.

It is anticipated that there will be no increases in the current staffing level over the next five years due to Vermont's austere fiscal situation. Additionally, there are no new nuclear facilities planned for the state; and, current environmental surveillance activities are not likely to increase in the near future.

VI. SOLID WASTE

Regulatory responsibility for solid waste management was assigned by the Vermont State legislature to the Board of Health; however, the administration of the program was delegated to the Agency of Environmental Conservation (AEC). Additionally, legislation has been enacted which prohibits the open burning of refuse at dumps or sanitary landfills.

In 1973, AEC published a Resource Recovery Plan which outlined a statewide plan for source separation by recyclable materials, their processing and ultimate reuse. However, due to a lack of legislative appropriations and a non-profitable secondary materials market, the plan was not implemented.

The Vermont solid waste program is located within the Division of Environmental Engineering and is currently staffed with four individuals in addition to a program chief, who has responsibilities divided between Vermont's air program and the solid waste program. The program also relies upon the Department of Water Resources Water Quality Lab and the Department of Highways' Soils Lab and soil drilling crews for laboratory analysis and sampling of municipal landfills. Solid waste disposal in the state is primarily managed by local governments.

VII. WASTEWATER

The Agency of Environmental Conservation (AEC) is Vermont's principal agency concerned with the management of wastewater facilities. Within AEC, the Department of Water Resources coordinates the state water pollution control program. The Environmental Engineering Division, also under AEC, provides the Water Resources Division with all necessary technical and engineering support and operates the state's municipal construction grants program.

The Division of Water Resources is staffed with sanitary engineers, chemists, water resource investigators, and environmental technicians. The Public Facilities Section of the Division of Environmental Engineering is staffed with environmental engineers. The total full-time workforce of the Agency of Environmental Conservation is 92. Most of the work of the Division of Environmental Engineering (about 75 percent) is under the auspices of the Water Resources Division.

The State of Vermont is currently promoting an austere fiscal program which may preclude any increased state assistance to the program. For this reason, the extent of growth or decline for the Agency's water pollution control workforce is in doubt. It is likely that the staffing level for the program will remain the same over the next five years.

VIII. ENERGY

Vermont's energy usage is, to a great extent, for space heating requirements which far exceed the national average. Energy costs in Vermont are double the national average, exclusive of the New England region. Strategies for future energy planning for Vermont are based on the philosophy that conservation measures must be stringent and accompanied by no contradictory penalties such as higher rates for low energy users.

Vermont has one nuclear power generating plant at Vernon operated by Vermont Yankee Power Corporation which generates 514 megawatts. No plans for more nuclear plants are underway at this time.

The Vermont State Energy Office was created by Executive Order in 1973 and made permanent by the legislature in the 1974 session. The 1976 staffing level was six persons. Among the Energy Office's activities are:

1) creation of a comprehensive energy program to include conservation of present resources, research and development of alternative energy sources, and planning for the most efficient and effective use of present and future energy resources;

2) development of educational programs for Vermont schools in energy conservation;

3) participation in the New England Energy Management Information System; and,

4) studies of alternative energy sources.

STATE OF VERMONT - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	15	--	--	--	--	--	N/A
NOISE[2]	1	1	1	1	1	1	0%
PESTICIDES[3]	7,339	--	--	--	--	--	N/A
POTABLE WATER[4]	468	--	--	--	--	--	N/A
RADIATION[5]	7	7	7	7	7	7	0%
SOLID WASTE[6]	5	(6)	(7)	(8)	(9)	(10)	N/A
WASTEWATER[7]	395	407	420	432	445	457	N/A
ENERGY[8]	6	--	--	--	--	--	N/A
TOTALS	8,236	--	--	--	--	--	N/A

[1]The above includes only state agency personnel. Private sector data were unavailable.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above represents 9 state agency personnel, 325 commercial pesticide applicators, 5,000 private pesticide applicators, and 2,005 licensed pesticide dealers.

[4]The above reflects 18 state agency personnel and 450 water supply operators.

[5]The above includes 4 individuals of the state's environmental radiation surveillance program and 3 individuals at the Vermont Yankee Nuclear Power Facility.

[6]The above includes only state agency personnel.

[7]The above includes 92 state agency personnel for which little or no growth is anticipated. Additionally, 240 certified operators are included with a workforce increase of about five percent per year. Finally, 63 private sector wastewater personnel are included; however, growth projections for this workforce were unavailable.

[8]The above includes only state agency personnel.

EDUCATION

Marlboro College's Environmental Studies Program which is designed to lead to a degree requires a total of 120 semester equivalent credits for completion. The program was started in 1975 and is taught by a total of eight instructors. Ten students were enrolled in 1976. The program is organized into two sub-programs. The first is a special seminar open to advanced students and coordinated by all eight faculty members. The second sub-program involves actual internship experience working for government, industry, or a conservation organization.

Norwich University at Northfield offers a program in Engineering Technology (Environmental). The program was started on the Bachelor level in 1971 and on the Master level in 1972. The courses are taught by one associate professor, one assistant professor and one instructor. The purpose of the engineering technology program is to produce engineering technologists who have the technical competence to work with environmental engineers, under minimum supervision, in the detection, evaluation, and control of pollutants.

The University of Vermont began an environmental studies program in 1972. In 1976, the academic enrollment in this program was 80, with 20 graduating that year. The curriculum in Environmental Studies offers students several alternatives leading to an individualized program of study.

LEGISLATION

The environmental/energy legislation for Vermont was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Conservation Law

Air Pollution Control Act

Pesticides Control Act

Pesticide Registration Act

Municipal and County Government Water Works Law

Radiation Protection Law

Beverage Container Law

Rubbish and Garbage Law

Water Pollution Control Law

Land Use and Development Law

National Environmental Energy Workforce Assessment

Phase I

VERMONT

State Report

STATE PROFILE

Vermont is 9,609 square miles in area. The estimated 1975 population was 471,000. Burlington, with a population of approximately 40,000, is the largest city. Vermont is bounded by the Connecticut River on the east; Lake Champlain forms much of the western boundary. The Green Mountains run north-south through the center of the state.

Per capita income in 1975 was $4,925. Value added by manufacture exceeds $688 million annually. Goods produced in Vermont include machine tools, computer components, stone and clay products (particularly marble and granite), lumber, furniture, paper, and plastic and rubber items. Dairy products comprise the bulk of the receipts for agricultural products which amounted to $217 million in 1974. Recreational tourism generates more than $300 million a year. Vermont has 141,000 acres in 74 state parks and is noted for hiking trails.

The sectors of the economy are apportioned as follows:

Manufacturing	27%
Recreation	16%
Services	12%
Wholesale and retail trade	11%
Finance, real estate and insurance	9%
Mining and construction	6%
Transportation, communications and public utilities	6%
Agriculture	4%

VERMONT POLLUTION CONTROL AND ABATEMENT AGENCIES

Vermont's environmental activities fall under the purview of four agencies: Environmental Conservation; the Department of Health; the Department of Agriculture and the State Energy Office. The offices within these agencies and their abbreviated functions are as follows:

1) Environmental Conservation (pollution control)
   Water Resources Department
   Environmental Engineering Department

2) Department of Health (environmental health problems)
   Division of Environmental Health
   Division of Industrial Hygiene
   Division of Occupational Health

3) Department of Agriculture (pesticides)
   Division of Plant Pesticides Control

4) State Energy Office (energy conservation/allocation)

The Water Resources Department, one of the main components of the Agency of Environmental Conservation, is responsible for protecting and regulating the waters of the state. Chemical, biological, bacteriological, and physical aspects are covered by programs concerning water quality and pollution control. Five of the eleven sections with the Water Resources Department have some direct responsibility for water pollution control and abatement. These include the following: the Water Quality Division which prepares river basin water quality management plans; the Oil and Hazardous Materials Section which responds to oil and hazardous materials spills; the Monitoring and Surveillance Section (the largest section) which consists of a laboratory services

unit and a field studies unit; the Enforcement Section which investigates complaints of pollution to state waters; and, the Permit Section which issues permits in accordance with the National Pollutant Discharge Elimination System (NPDES).

The Environmental Engineering Division of the Agency of Environmental Conservation consists of three sections: Public Facilities Engineering, Solid Waste, and Air Pollution. Aside from its engineering duties, the Public Facilities Engineering Section has also instituted a mandatory certification program to ensure that operators of municipal water pollution control facilities are skilled in basic operating techniques and laboratory procedures. The prime function of the Solid Waste Section is the approval and upgrading of land disposal operations within the state. The Air Pollution Section monitors and inspects suspected sources of air pollution to bring them into compliance with the State Implementation Plan (SIP) for the achievement of national air quality standards.

Within the Department of Health, the Division of Environmental Health is responsible for water supply programs, the Division of Industrial Hygiene is responsible for noise programs, and the Radiological Health Program of the Division of Occupational Health is responsible for radiation programs.

The purpose of the State Energy Office is to create a comprehensive energy program including conservation of present resources, research and development of alternate energy sources, and planning for the most efficient and effective usage of present and future energy sources.

The following comments were made by a spokesman for the Agency of Environmental Conservation on the subject of pollution control and abatement workforce projections for the Agency:

- The Agency employs 431 people, the majority of whom have dual roles within the areas of conservation and pollution control;
- Funds are limited for personnel training and are becoming increasingly scarce;
- Norwich University offers a program in sanitary engineering which is designed to meet the needs and time schedules of Agency employees. There are approximately twelve employees currently enrolled in the University master's program. They pay their own tuition;
- The Agency has an extremely high turnover rate due to the salary scale. While the older employees tend to stay for the retirement benefits, the younger professionals leave for better opportunities and are extremely difficult to replace. Turnover rate is approximately 20 percent;
- Funding for the Agency is 60/40, federal (USDA, Water Resources, and EPA)/state;
- Any increases in the Agency's funding will go into water quality and forestry programs, with no increases in fish and game programs;
- As far as Vermont is concerned, most of the funds should be going into forestry to preserve what already exists due to the fact that one out of five Vermont citizens is engaged in some aspect of the wood industry. All pulp mills in the state are in compliance with the law;
- There appears to be an emerging toxic substances problem in the state due to chemicals such as polychlorinated biphenyls (PCBs), lead, and other heavy metals;
- Vermont will emphasize resource reduction rather than resource recovery;
- Two weeks of training per year for employees of the Agency would be beneficial;

- Bureaucratic responsibilities are increasing for the Agency due to P.L. 92-500. However, despite the increased workload, progress has not decreased;

- Person-Years Devoted to Pollution Control and Abatement:

Section of Agency:	Person-Years
Environmental Engineering	67
Water Resources	50
Division of Protection	12
Act 250 - Land Use	10
Foresters	5
TOTAL	144

- Five to Ten Year Pollution Control and Abatement Workforce Projection:

Section of Agency	Additional Positions
Forestry	4 in each county office including 1 supervisory position (approximately 50 more)
Park Maintenance	10
Fisheries and Game	4
Water Resource Quality	15
Environmental Engineering	30
Protection	6

Pollution Control and Abatement Programs

I. AIR

A. Introduction

Vermont's Air Pollution Control Program, which is located within the Division of Environmental Engineering of the Agency of Environmental Conservation, should be considered the model state air program in New England. With a limited amount of resources, this program has developed a sound, successful strategy with a concerted effort directed toward total program management and evaluation. A considerable amount of this sectional report was prepared directly by Vermont's Air Pollution Control Section with only minor revisions required to fit the information into a standard reporting format. A special thanks is extended to Mr. Richard Valentinetti, Vermont Air Pollution Control Program Director, for his invaluable assistance in providing much of the content of this report.

The State Legislature created the Air Pollution Control Program in 1968 when the legislature adopted Title 10, Chapter 23 of the Vermont Statutes Annotated. The legislature provided authority to control air pollution within the jurisdiction of the State Department of Health, subsequently transferred to the Agency of Environmental Conservation.

The Secretary's authority to conduct an air pollution control program is contained in the provisions of 10 V.S.A. 23. Among the powers conferred on the Secretary include the authority to adopt and amend regulations, hold hearings, prepare and develop a comprehensive plan for the prevention, abatement and control of air pollution in the state, encourage voluntary cooperation and the general administrative

legislative action. The first specific exception from the Air Pollution Control Regulations was adopted by the 1971 session of the legislature and exempted steam locomotives, engines in rolling stock used in connection with the operation of a railroad. Though this legislation only applied to one specific source (Steamtown Foundation which was under permanent variance) the legislature felt that this class of sources should be permanently removed from the Air Pollution Control regulations.

During this same session, the legislature legalized the burning of natural wood and chemically untreated wood within a municipality with the permission of the Fire Warden and the legislative branch of the municipality. The 1973 legislative session further expanded the burning of natural and chemically untreated wood for fuel, except when the emissions of such burning would be considered a potential violation of National Air Quality Standards by the EPA.

Wood burning in large plants has continued to create localized smoke and nuisance problems over which the Section has very limited legal control. The Section continues to inspect wood burning sources and to encourage proper methods of the operation on an informal, cooperative basis.

The control of air pollution in Vermont has been primarily implemented through the application of three categories of control regulations. The most frequently applied regulation limits the visible density of smoke that a source may legally emit from its stack or other emission point. A chart consisting of white blocks with black

cross-hatchings is used as a reference device for training inspectors. The percentage of the white block obscured by the black cross-hatching, when observed at a distance, can be compared to the shades of gray from a smoking stack. The density of the smoke can be judged from 0% (which would be a clear stack) to 100% (which would be a stack emitting smoke which is totally opaque). Inspectors use this method as a primary means of determining source compliance. By pointing out excessive visible emissions, state inspectors are also making fuel combustion operators aware of poor combustion characteristics which, if corrected, can save them money in operating costs. Though this method may appear to be a crude means of determining source compliance, it has been tested in the courts and has proven to be a reliable evaluation tool.

A second regulation, mass emissions limitation, simply limits the weight of various pollutants that can be discharged from a stack into the atmosphere. Mass emission limitations are integrated into overall control strategies to clean up the air and reduce ambient concentrations of particulate matter and can be measured through stack test procedures.

A third regulation that has experienced wide application is the prohibition of open burning. Open burning is generally prohibited with the exception of certain types of burning. This regulation has effectively brought burning in dumps to a halt and has tightened control on other types of previously unregulated burning.

Outside of these three major regulatory areas, other regulations have been developed to limit additional types of potential air pollution problems. Those regulations include provisions governing nuisances and odors, gaseous emissions, and allowable sulfur in fuel.

The overall purpose of the air pollution control regulations has been to reduce emissions into the atmosphere. This has been accomplished indirectly by limiting visible emissions and directly by limiting emission output on the basis of weight of material being processed. As a result of the emission limitations, ambient pollutant concentrations across the state have generally been reduced.

An adequate definition of the air pollution problem in the State of Vermont has to be considered on three levels: general air pollution, localized air pollution, and air pollution generated outside the state.

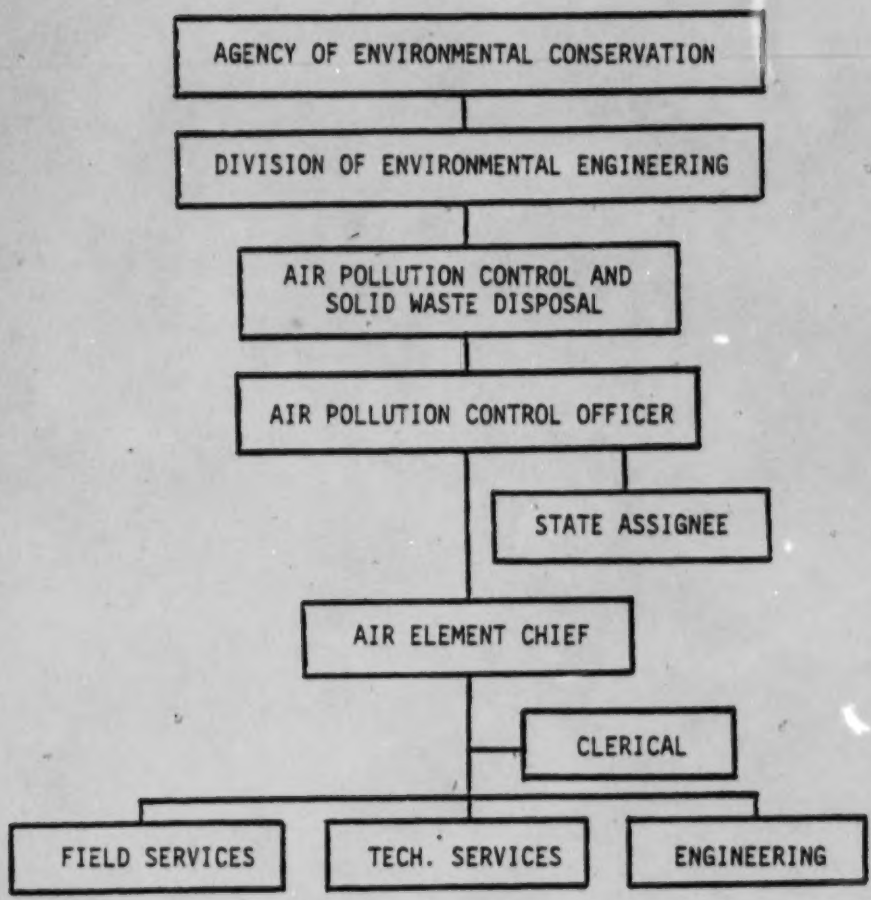
The Air Pollution Control Section has conducted extensive surveys of all air polluting sources in the State. The State of Vermont, with its relatively small population and its extensive rural background, does not have the same pervasive air pollution problems associated with urban areas. However, there are cases throughout the state in which localized air pollution problems do exist. By localized air pollution, it is meant that a receptor (usually human) is downwind from the pollution source such as an open burning dump or industrial source. The topography and land use in Vermont are such that one has to consider small sections of the state when assessing these air pollutant emissions and the effects of the regulations on emissions on future air quality. Towns are isolated from each other; they tend to be in valleys, separated by ridges. Hence, they generate their own local pollution and receive little from outside sources as far as SO_2 and particulate matter.

Although the primary pollutants (sulfur dioxide, particulate matter, carbon monoxide and hydrocarbons) are usually measured by ambient air monitors a short distance from their source of origin, there has been increasing evidence that complex secondary pollutants (photochemical oxidants, submicron particulate matter, and sulfates) are carried by large air mass movements. The photochemical oxidants and submicron particulate matter have been associated with loss in visibility. With only a minimum meteorological data available, the Section has not been able to establish firmly if there has been a significant loss in visibility in the Champlain Valley or if the awareness of people living in that area has increased, but it has been mentioned as a concern of many Champlain Valley residents. More evidence is indicating that the gaseous sulfur dioxide (SO_2) that is being created in the midwest in burning fossil fuels is falling in New England as a solid sulfate (SO_4). Preliminary health information on sulfates have demonstrated that the sulfates (SO_4) are more of a culprit in relation to health effect than the previously believed sulfur dioxide (SO_2). There seems to be similar problems in the long term photochemical oxidant reactions and transport. Pollutants must be monitored even though, under present federal law, there are no methods available to control these secondary pollutants from infiltrating to Vermont. However, with substantial data from Vermont as well as the other northeastern states, a data base can be developed to require control of these pollutants on a national level.

B. Workforce Profile

The Vermont Air Program has the following organizational structure.

VERMONT AIR POLLUTION CONTROL PROGRAM



The Air Pollution Control Section is located in the Division of Environmental Engineering, Agency of Environmental Conservation. Although the implementation of the program with a relatively small staff requires that the staff participate in all program activities to some extent, program responsibilities are divided as shown in the preceding Organizational Chart.

The Air Pollution Control Officer is responsible for planning, organizing, and directing the Air Pollution Control Program as well as the Solid Waste Program. Assigned directly to the Air Pollution Control Officer in a staff position is a State Assignee from EPA. The State Assignee is primarily involved with those aspects of the program involved with the Federal EPA, Federal Regulations and reporting, as well as Federal Register review and comment. The Chief Air Pollution Control Engineer is responsible for the supervision and coordination of operations of the staff. The three functional work units include:

1) Technical Services Unit: The prime purpose of this unit is to operate the State's air monitoring network including ancillary duties of maintenance and calibration of air monitoring equipment, data acquisition reduction and retrieval.

2) Engineering Services: The prime duties of this unit include the preparation of technical reports, guides and criteria, review of impact statements, compilation of emission inventory data, special studies, regulations processing, computer modeling, general engineering support, and new source review.

3) Field Services Unit: The unit is responsible for scheduled inspection of air pollution sources, general field surveillance, citizen complaints, process evaluations and follow-up inspections of air pollution sources.

Table I is included to depict the current staffing level of the air pollution control program. Additionally, figures since 1970 are included to show program growth.

TABLE I

AGENCY OF ENVIRONMENTAL CONSERVATION

Division of Environmental Engineering
Air Pollution Control Program
Current (1976) Staffing Level*

Position	1976
Air Pollution Control Officer	1
Engineer	6
Technician	1
Specialist	5
Clerical	2
Chart Reader	1
TOTAL	16

*Laboratory support issupplied by the State Department of Health, Division of Occupational Health.

The air pollution control program has grown from a staff of three in 1970 to a present day staff of 16 as shown in Table I. The growth, though steady, still leaves the state's available workforce far below predicted needs. An internal analysis of workload has shown the need for a total staff of twenty-one. A similar analysis performed by the Federal Environmental Protection Agency (EPA) shows projected workforce at a level of thirty-two and one-half. In either case, the predicted values are far above the existing workforce available to handle the complex work of the Section. It is difficult to visualize increases in the workforce at this time,despite the need, due to the fiscal situation.

State funding for the air program is currently matched by the federal government at a rate of 2 to 1. State funding increased from FY 1970 through FY 1974. Funds for FY 1975 were at the same level as 1974. The intent of Congress not to allow federal funds to supplant local

funding was included in the Clean Air Act provision that required the state to spend local funds at least equal to the amount spent during the preceding fiscal year, with no decrease in state spending allowed. Should a state fail to spend sufficient state money, all federal funding would be lost. For the State of Vermont, this means that, if the state fails to spend at least $51,500 in direct state expenditures for air pollution control effort, it will lose $180,000 in federal funds.

The information below describes the functions of the various air program elements. There is a myriad of minor tasks performed by the program that cannot be included in this section, although all major functions are thoroughly described.

The Air Pollution Control Section source surveillance program is carried out by the Field Services Unit. The unit inspected approximately 600 actual or potential sources of air pollution in 1975, almost double the number of sources inspected in 1974. The increase in inspections is a direct result of a planned approach to the inspection process and serves several purposes. It is a means of verifying source emission information, determining source compliance, and maintaining contact with the public and with industry. A field surveillance visit report form is completed at the time of the source visit. At the present time, inspections account for a portion of the work effort of these staff members. An inspection can take from one-half to four hours to conduct and may result in the need for additional follow-up inspections.

A more specific means available to the Agency for verifying source compliance is the "stack test". This procedure utilizes sophisticated equipment and highly trained personnel to measure concentrations

and amounts of pollutants coming from a source's smoke stack. To date, nine stack tests have been witnessed by state personnel to evaluate source compliance with air pollution regulations. Due to the expense involved in conducting stack tests, the workforce required, and the high degree of success with visual observations, the procedure is not used as a primary compliance tool.

Primary compliance determinations are made through visible emissions observations. These observations are made while inspectors and engineers are enroute to source inspections and as a general field service function. Inspectors are certified to "read smoke", that is, to judge the various densities of gray smoke and opacity and to determine opacity violations. This method has been tested in the courts and is the accepted method for certification.

The regional engineers in the Agency's district offices have been trained recently to read smoke, and will add to the staff's field capability.

As an additional part of the compliance effort, fuel oil samples have been taken to evaluate sulfur content of oil supplies being stored and sold in the state. Present laboratory techniques and limited support staff in the state laboratory preclude any major oil sampling effort. It is expected that the purchase of a special instrument designed to provide rapid sulfur in fuel analysis will correct this program deficiency by April 1976.

Citizen complaints are an integral part of the compliance program. Since August 1973, when a complaint log was initiated, 71 complaints have been received by the Section. In accordance with Agency policy, complaints are responded to within a maximum of 48 hours. Approximately 10 percent of the complaints received result in enforcement actions. The remaining percentage are resolved through means short of enforcement, or found not to be justified.

A primary program goal is the adequate review of new sources of air pollution to determine compliance with the existing air pollution control regulations and to assure the continued good quality of our air resources. Although the Vermont Air Pollution Control Regulations include provisions for new source review, most new source review has been conducted through the Act 250 process in the Agency's effort for "one-step" permit processing. Through this Act, certain types of development come under state scrutiny and those that are considered significant from an air pollution standpoint are reviewed and testimony presented to the district environmental commission. The district commission has considered the Section's technical comments in their deliberations. This has resulted in a condition to the land use permit, or resolution of technical issues raised.

Due to the use of the Act 250 permit process, the air pollution control regulation regarding new source review has resulted in few source applications since its adoption. Smaller new or modified sources that do not fall under the jurisdiction of the Act are usually discovered through the day-to-day work of the field services unit.

Compliance actions have been triggered by several mechanisms, both internal and external, to the Air Pollution Control Section. Though minor violations of the Air Pollution Control Regulations (such as operational problems resulting in a first violation) are disposed of at the site by a change in operation, the state has various options for the final disposition of a violation.

1) Act 93 of the 1971 Legislature established the procedure whereby the state and the alleged violator hold a conference, if an abatement schedule can be agreed upon, the state and the alleged violator sign an assurance of discontinuance (consent agreement) which would include the abatement schedule.

2) The Secretary may issue an order to cease and desist. This procedure is used for recurring violations, such as open burning. If the order of the Secretary is not complied with, the Secretary may proceed with criminal prosecution through the State Attorney's Office.

3) If deemed appropriate, the Secretary may institute direct criminal action through the State Attorney's Office. The State Attorney may proceed against the violation of the state law without notification to the Secretary, however, the Attorney's Office has usually confined these cases to non-technical violations, such as open burning.

4) If deemed appropriate, the Secretary may institute civil action through the Office of the Attorney General.

Air quality monitoring began in 1970 with a total of seven monitoring stations. By 1971, there were seven stations monitoring particulates; two stations monitoring sulfur dioxide, carbon monoxide, hydrocarbons and nitrogen dioxide; and three stations monitoring ozone. Site selection for these initial stations was primarily based on location of population centers, protection from vandalism and availability

of electrical power, with one site chosen as a rural background site. As of October 1975, the number of monitoring sites had been increased to 14, with one proposed site yet to be established. Of the 14 sites, all 14 are monitoring particulates; three are monitoring SO_2; two are monitoring carbon monoxide; and one is monitoring oxidants, nitrogen dioxide, and hydrocarbons.

The Burlington station located in the downtown area is the best equipped. Ten different parameters are monitored at this site. Much of this monitoring is accomplished using automatic equipment which runs continuously, providing a readout of concentrations of various air pollutants. Data handling is facilitated with the use of special data logging equipment installed at this station. The Rutland station has recently been upgraded by replacing the small weather-beaten trailer with a new, larger unit. Seven parameters will be monitored at this location when installation is complete. Data logging equipment will also be utilized at this site.

Three high volume sampler sites for measurement of suspended particulate matter have been added to the state's air quality monitoring network. One of these is located in Lyndon and one in West Burke. These sites have been set up in cooperation with the Meterology Department at Lyndon State College and the Forests and Parks Department. The third site is in Northfield and has been set up in cooperation with members of the Environmental Technology Program of Norwich University. Collection of samples is done by members of these departments, while coordination, maintenance of equipment, and analysis of samples are done by members of the Air Pollution Control Program.

The calibration of air quality monitoring equipment used at the monitoring sites has represented a substantial problem (over the past six years) due to lack of workforce. During the period of 1970 to 1973, routine servicing of instrumentation and equipment was performed by a single technician on the Section staff. This left little time for development of a comprehensive calibration program. Recently, increased workforce in the Air Quality Monitoring Section has improved operation and in-house calibration procedures. In addition to the in-house calibration program that is being developed, a consultant has been awarded a contract to independently check and calibrate ozone monitors, carbon monoxide monitors, sulfur dioxide monitors and particulate monitors. This represents the first time the air program has conducted a scheduled calibration program.

The validity of air quality data has come under particularly close scrutiny since the discovery in December 1974, of three apparant violations of primary SO_2 standards in Rutland that had occured during October 1974. Lack of workforce in the data reduction area is evidenced in the delayed discovery of the high SO_2 readings. The validity of these readings has recently come under question due to a number of factors. With a calibration program underway and with the services of a chart reader and technician, the validity of data as well as its overall quality can be expected to improve. This improvement may be temporary in nature if permanent staff cannot be hired to handle the tasks of instrument calibration, data reduction and quality assurance.

The only recent expansion in the existing monitoring program has been to estbalish a second SO_2 site in Rutland. This action was necessary to evaluate the meaning and significance of the apparent SO_2 violations of 1974.

Program emphasis in the air quality section will be to improve the quality, validity, and reliability of the data rather than to establish additional monitoring sites.

Violations of the federal standards for both carbon monoxide and oxidants have recently occurred in Burlington. The significance of these violations is being studied in depth since they relate primarily to automotive source emissions. The State regulations contain an anti-tampering provision for the federal controls on automobiles, but the Section does feel that additional control on the automobile, or traffic controls are needed until these data can be fully evaluated. The factors such as monitoring station locations, instrument reliability, and meteorological conditions are being reviewed in an attempt to isolate the cause of violations.

In the private sector the size and extent of the workforce involved in abating and controlling air pollution is unknown. However, the following industries represent major sources of air pollution in Vermont. Generally one or more individuals are involved in maintaining the industry's air pollution control equipment.

- Asphalt plants
- Incinerators (Public and Private)
- Mineral Industry
- Granite Industry
- Wood Industry
- Electric Generating Stations

C. Workforce Projections

The workforce employed by the State of Vermont to ensure its air quality has been growing slowly over the past five years; however, sources have suggested that the current rate of growth is inadequate. Unfortunately the State of Vermont has initiated a "no growth" policy which has severely restricted the effective functioning of almost every state agency program. At this time consideration is being given to redefining the air program's goals and commitments so that the current workforce can function effectively through a reduction in its scope of work and responsibilities.

The air pollution control program is now staffed with 16 individuals. An internal reappraisal of resources require to function adequately, given present responsibilities, showed that the program should be currently staffed by 21 employees. Additionally, EPA analyzed the existing programmatic responsibilities and determined that adequate program operation would require a staff of 32½ individuals which represents more than a 115 percent increase of the program's current workforce.

Despite the fact that across the board increases in program growth are needed, the unknown nature of future federal EPA Clean Air Act funding coupled with Vermont's own tenuous commitment to program assistance have made any realistic workforce projections unapproachable. At this time only workforce needs can be discussed.

D. Training and Certification

Formal training and certification program sponsored by the Agency of Environmental Conservation have not been approached due to severely limited funding authorizations. Additionally, money for air program staff members to attend training sessions or courses sponsored outside Vermont government is limited. Access to training sponsored by EPA's Air Pollution Control Institute (APCI) or universities in the immediate area is restricted due to the enormity of the costs involved. In FY 1976 the air program sent only three individuals to APCI training.

Currently the state's further education policy, or lack thereof, has resulted in some problems for staff upgrade training. However, some upgrade training at the University of Vermont has occurred and has been primarily in the area of management.

Vermont is a member of the New England Steering Committee for Air Use Management (NESCAUM) which has established a training committee to explore the possibilities of establishing formal training sessions and/or seminars. Currently this group is developing a program whereby funding available under the Comprehensive Employment and Training Act (CETA) would be used to train entry-level employees of state air programs.

The New England Consortium for Environmental Protection (NECEP), an EPA funded group, has established a formal internship program for graduate and undergraduate students for placement in state environmental agencies. The Air Pollution Control Program in Vermont has

participated extensively in this program which has placed students into its program for the summer months. NECEP is geared to make the student self-sufficient and contribute to overall program operation. The Director of the air program has commended NECEP on its innovative career training approach and believes additional efforts should be made to expand the dimensions of this program.

Finally, although not considered training in a formal sense, technical assistance is offered on a continuing basis to non-complying industries in the state. State program personnel provide extensive guidance and suggestions for private sector firms on how to upgrade and improve current air pollution control practices so as to meet federal and state air quality standards.

E. Career Potential

Career potential in air pollution within Vermont will be limited over the next five years. As the state government is the primary employer of full time professionals and it expects very few openings in the immediate future due to state fiscal constraints as well as unknown future federal funding, the development of new careers appears limited, to say the least. However, if adequate funding does become available, Vermont's air program has estimated that approximately five person-years will be needed to staff all new program requirements recently suggested by EPA.

F. Conclusion

In the past six years, the Air Program in Vermont has moved forward slowly, increasing the workforce at a less than adequate rate to ensure the successful completion of its ever expanding responsibilities. Particular areas of weakness that are now receiving attention include the monitoring and field services efforts.

Unfortunately, the need for increased workforce has been recognized at a time when all state programs are operating under a virtual "no growth" policy. Serious consideration is being given to a re-evaluation of program objectives and commitments in an effort to make a realistic determination of the future direction of the program. In the monitoring program, the Section will continue its efforts to improve data quality, with emphasis on instrument calibration and quality control related to existing monitoring sites. The source surveillance program will continue to ensure maintenance of compliance by the pollutant sources across the state. The engineering program will move forward, continuing to improve the emissions inventory data base and to carry out other engineering functions.

The most unpredictable elements in the future direction of the air program are the future federal requirements. It has become unquestionably clear over the past five years that federal involvement and requirements will continue to expand and become more complex. The future direction of the Vermont air program will no doubt be largely a product of the course followed by the federal EPA. Significant changes in the Clean Air Act are anticipated in the immediate future, changes that may well give a better indication of what the new federal requirement will be.

II. NOISE

Within the state of Vermont there exists no legislative mandate for the abatement and control of excessive noise levels. For any matters relating to noise, the Division of Industrial Hygiene of the State Department of Health has been designated as the principal contact. Generally, they respond and consult on a complaint basis and try to rectify any unusual conditions through arbitration with the parties affected. Well under one person-year is devoted (or necessitated) to noise abatement and control matters within Vermont. Noise is generally not a problem in Vermont due to the state's rural demographic nature, thus it does not appear likely that a formal program, with legislative directions, will be developing within the next five years.

III. PESTICIDES

A. Introduction

The Vermont Department of Agriculture (VDA) has been designated as the State Lead Agency for the administration of the Federal Insecticide, Fungicide, Rodenticide Act's (FIFRA) Pesticide Applicator Certification Program (private and commercial). The Agency's Division of Plant Pest Control is responsible for implementation of this program in addition to coordination of training and certification activities, licensing of pesticide dealers, issuance of special permits, and the coordination of field, laboratory, and office activities relating to pesticide regulation.

Within Vermont's state plan, the Vermont Pesticide Advisory Council (VPAC) and the Vermont Extension Service (VES) of the University of Vermont have been designated as cooperating agencies. The VPAC is responsible for reviewing pesticide use and related activities and makes advisory recommendations. VES is responsible for the organization and operation of the pesticide applicator training program offered prior to certification and for training offered in conjunction with maintenance of the state plan.

Since 1970, Vermont Pesticide Laws have required licensing for commercial applicators. Since 1947 Vermont has also required pesticide product registration. Both laws have been ammended to comply with FIFRA. There are currently 2,600 registered pesticide products in Vermont.

Regulatory activities which supplement the applicator certification program include state registration, as mentioned above, the classification of all pesticides into one of three classes designated A, B, and C; and the inspection and sampling of all pesticide products. Additionally, pesticide disposal and pesticide container reuse and safe handling are regulatory authorities of the Division of Plant Pest Control. Twenty percent of the program is federally funded.

B. Workforce Profile

The Division of Plant Pest Control of the Vermont Department of Agriculture has the organizational structure as shown on the chart at the end of this section.

As shown, an active relationship exists with both VES and VPAC. VES, as mentioned, is the primary delivery mechanism for applicator training. The Vermont Pesticide Advisory Council has the following functions:

1) To review insect, plant disease, weed, nematode, rodent, noxious wildlife, and other pest control programs within the state and to assess the effect of such programs on human health and comfort, natural resources, water wildlife, and food and fiber production, and where necessary make recommendations for greater safety and efficiency.

2) To serve as the advisory group to the aeronautics board relative to the safety and effectiveness of aerially applied pesticides, and to such other state agencies having responsibilities for the use and and dispersal of pesticides.

3) To advise the executive branch of state government with respect to legislation concerning the use of various pest control measures.

4) To suggest programs, policies, and legislation for wise and effective pesticide chemical use in Vermont as the need arises.

5) To prepare annually or more frequently as deemed necessary, a summary of pesticides which because of their hazardous characteristics or properties warrant special surveillance and stricter control of availability and use.

6) To control imports from out of state.

One staff member of each of the agencies/organizations listed below comprise the Council:

1) The Fish and Game Department;

2) The Department of Water Resources;

3) The Department of Agriculture;

4) The Department of Forests and Parks;

5) The Department of Health;

6) The Aeronautics Board;

7) One physician from the College of Medicine of the University of Vermont nominated by its dean;

8) One representative in the area of entomology, plant pathology or weed control from the University of Vermont Extension Service to be named by the director; and

9) One representative in the area of pesticide research from the Vermont Agricultural Experiment Station named by the dean of the College of Agriculture of the University of Vermont.

Table II depicts the staffing level of the Division of Plant Pest Control.

TABLE II

VERMONT DEPARTMENT OF AGRICULTURE

Division of Plant Pest Control
Current (1976) Staffing Level

Position	1976
Entomologist	2
Pathologist	1
Field Agent (technician)	3
Clerical	3
TOTAL	9

Within Vermont, distributors of pesticide products are classified into 3 categories: A, B, and C, with A representing restricted use pesticides. Table III represents the number of establishments marketing these classes of pesticide products.

TABLE III

STATE OF VERMONT

Current (1976) Pesticide Dealers

CLASS *	Dealers in 1976
A	98
B	216
C	1,691

* Class A - Commercial Use Only
Class B - Limited Use Only
Class C - Household Use

There are currently 250 certified commercial applicators within the state. This number has been static for the past few years due to

attrition and new entries offsetting one another. The following table is a list, by category, of the number of commercial establishments, and the number of applicators employed and certified.

TABLE IV

STATE OF VERMONT

Current (1976) Certified Commercial Applicators
by Category and Number of Establishments

Category	Establishments	No. Employed
Agricultural Pest Control Plant - The use of pesticides in production of food, forage and fiber agricultural crops. Pest Control - The use of pesticides in forests, nurseries and forest seed producing areas.	11	33
Agricultural Animal Pest Control The use of pesticides on animals and to places on or in which animals are confined. Doctors of Veterinary Medicine engaged in the business of applying pesticides for hire, publicly holding themselves out as pesticide applicators, are included in this category.	2	3
Forest Pest Control - The use of pesticides in forests, forest nurseries and forest seed producing areas.	3	4
Ornamental and Shade Trees - The use of pesticides to control pests in the maintenance and production of ornamental trees, shade trees, shrubs and flowers.	23	55
Turf - The use of pesticides to control pests in the maintenance and production of turf.	6	11
Seed Treatment - The use of pesticides on seeds.	1	1
Aquatic Pest Control - The use of pesticides for purposes other than of public health, on plants or animals applied to standing or running water.	3	10

TABLE IV
(continued)

Category	Establishments	No. Employed
Rights-of-way Pest Control - The use of pesticides in the maintenance of public roads, electric power lines, pipelines, railway rights-of-way or similar areas.	22	58
Industrial, Institutional, Structural and Health Related Pest Control - Use of pesticides in, on, or around food handling establishments; human dwellings; institutions, such as schools or hospitals; industrial establishments, including warehouses and grain elevators; and any other structure and adjacent area, public or private, for the protection of stored, processed or manufactured products.	10	33
Public Health Control - The use of pesticides in public health programs for management and control of pest having medical and public health importance.	5	9
Regulatory Pest Control - The use of pesticides by State, Federal and other governmental subdivisions for the control of regulated pests.	3	12
Demonstration and Research Pest Control - The use of pesticides by individuals who demonstrate to the public, supervise demonstrations, or conduct field research with old, new or experimental use pesticides.	2	5
Aircraft Pest Control - The use of pesticides applied from any aircraft.	3	16
TOTAL	94	250

C. Workforce Projections

It is anticipated that growth of the Division of Plant Pest Control will be a result of the implementation of the restricted use

list which is currently under review. The last increase in the Division occurred in 1970 when 3 new positions were added, which at that time gave the division a total of six. Since 1971 there have been 9 people employed and since the enactment of the ammended FIRRA no growth has occurred due to the fact that the state law was well ahead of the federal law and satisfied all federal requirements. However, the workload of the Division has increased. Growth estimates for the next five years were not available from Division personnel.

The commercial applicator group will approach 325 when the program is at full capacity in late 1977. If the restricted use list grows to include certain dairy pesticides not currently restricted, approximately 90% of all dairy farmers in the state will need to be certified.

Table V summarizes the preceding information.

TABLE V

STATE OF VERMONT

October, 1977, Pesticide Workforce Staffing Levels for the Private Sector (est.)

Classification	1976
Commercial Applicators	325
Private Applicators	5,000
TOTAL	5,325

D. Training and Certification

Vermont had a commercial applicator program prior to that required by FIFRA and has already certified most in this category.

Training in Vermont is conducted by the Vermont Cooperative Extension Service in cooperation with the Division of Plant Pest Control. Commercial applicators certified under Vermont law currently meet federal requirements for certification. To assure the maintenance of a high level of competency among certified commercial applicators, training provided by VES will be offered on a continuing basis. After an applicator has been certified for 5 years, the requirements for recertification may be met by one of two options: attendance and active participation in an agency approved training program special to the applicant's categories of certification; or successful passage of an examination. Private applicators must meet the same requirements.

Private applicators will be certified initially for use of restricted use pesticides under one of four optional procedures. The following list of options were provided in the summary of the Vermont State Plan.

1. Applicants will participate in a VDA/EPA approved group training program to be conducted by VES that will utilize films, slides, the Northeast Regional Pesticide Training Manual and lectures. Training will be offered in both the general area of knowledge and in commodity oriented specific areas of agricultural pest control. The requirements for section 4(a) (1) of the FIFRA, amended 1975, will be met by use of a written examination given near the end of the training. This examination will be graded upon completion by the applicant after which the basis for correct answers will be discussed. Applicants certified by this procedure will be required to complete an attestation form that will be countersigned by a Lead Agency official.

2. Applicants will be required to pass a written examination administered and later graded by a Lead Agency representative. No prior training will be offered or be required before taking the examination.

3. Applicants will be offered benefit of individual training by participation in an autotutorial training program and upon completion be required to pass a written examination administered and later graded by a Lead Agency representative or an official designee. The autotutorial teaching facility will be prepared by VES and offered at one more yet to be designated locations on a prior reservation basis at times most suitable to the applicant's needs. Training materials offered will include film strips, slides accompanied by supporting taped narration and lecture materials and appropriate training manuals where available.

4. Applicants will be offered training through individual use of Programed Instruction Manuals producted by EPA. The determination of competency required for certification may be met by completion of the examination included with the manual after which the applicant will be required to either surrender the manual or that portion containing the completed examination to the Lead Agency for scoring.

Training statistics for Vermont can be seen in Tables VI, VII, and VIII. It should be noted that the summary numbers shown do not represent the number of certified applicators. All figures indicate the number of participants in individual applicator training sessions on a cumulative basis. For instance, one individual might elect to receive training in more than one licensing category; thus, this individual would be counted more than once in these figures. The following tables merely show the bulk of training needed, and the figures are not necessarily proportional in any way to the number of certified pesticide applicators.

Table VI shows the current status of Commercial Applicator Training. Table VII represents the extent of private applicator training

activities. Table VIII summarizes the status of all pesticide applicator training in Vermont. As all tables evidence, Vermont has a considerable amount of training to be completed.

TABLE VI

STATE OF VERMONT

Status of Commercial Applicator Training as of January 1, 1977

Anticipated Total Training Participants by October, 1977	Numbers Trained as of January, 1977	Numbers Still to be Trained by October, 1977
769	269	500

TABLE VII

STATE OF VERMONT

Status of Private Applicator Training as of January 1, 1977

Anticipated Total Training Participants by October, 1977	Numbers Trained as of January, 1977	Numbers Still to be Trained by October, 1977
4,192	792	3,400

TABLE VIII

STATE OF VERMONT

Status of All Pesticide Applicator Training as of January 1, 1977

Anticipated Total Training Participants by October, 1977	Numbers Trained as of January, 1977	Numbers Still to be Trained by October, 1977
4,961	1,061	3,900

Source: Regional Support Branch, Operations Division, Office of Pesticide Programs, U.S. Environmental Protection Agency

E. Career Potential

Career potential at the state level with the Division of Plant Pest Control will be determined by the extent of the restricted use list and its impact on the program's certification/training activities. New career openings in the private sector are unknown and will not be readily determinable until the present workforce is certified, thus defining the scope of the labor force. Attrition rates and new entries can then be determined on a yearly basis to provide some idea of growth in this sector.

F. Conclusion

It is likely that no significant increases will occur at the state level in Vermont, primarily due to the fact that a commercial applicator certification program was operational prior to FIFRA implementation requirements. However, professionals suggest that if the restricted use list grows, necessitating additional training and/or certification activities, workforce growth will necessarily occur. At the private/commercial level, the workforce is currently being defined, and once defined, specific career potential and workforce projections can be determined. However, no significant growth is expected unless the restricted-use list generated by EPA expands rapidly. If certain dairy pesticides are listed, than a substantial growth in private certified applicators should occur.

VERMONT PESTICIDE PROGRAM ORGANIZATION

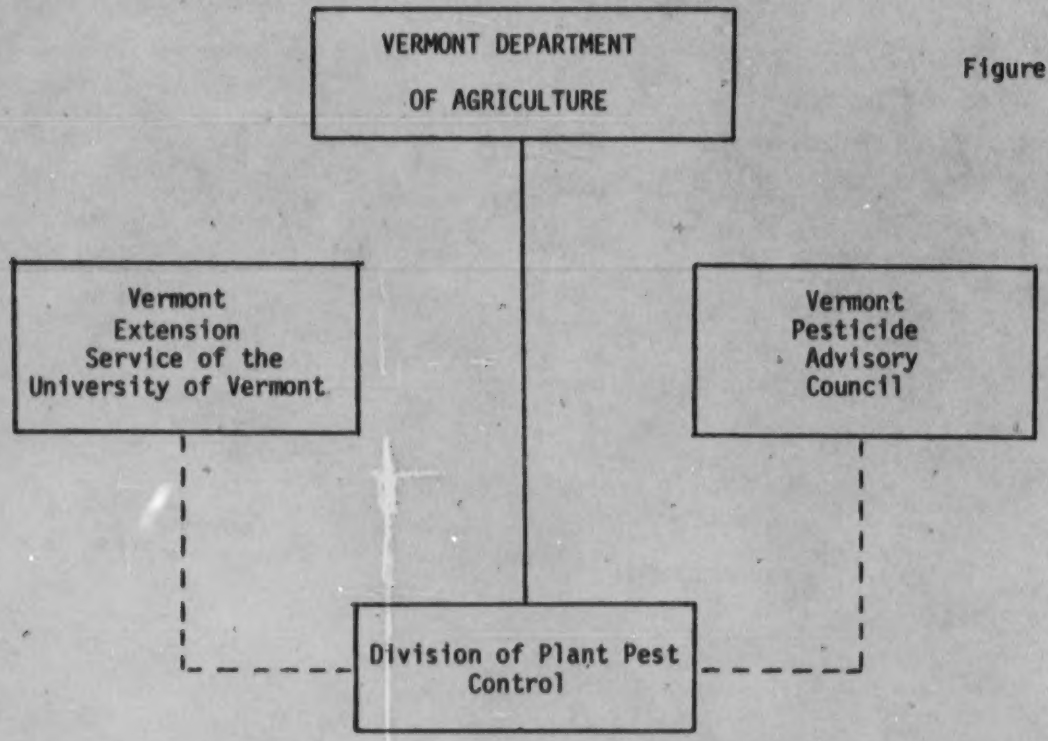


Figure 1

IV. POTABLE WATER

A. Introduction

Drinking water in the State of Vermont is administered by both the Agency of Human Services (AHS) and the Agency of Environmental Conservation (AEC), with the latter considered the lead agency. AEC's functions involve the construction of municipal water treatment facilities. AHS is concerned with ensuring all health and hygiene aspects of public drinking water in the state and is the state's primary agency for implementation of all provisions of the Safe Drinking Water Act (SDWA) of 1974. Currently the program, as well as sections of its laboratory, is subsidized by EPA grants under SDWA. The state has accepted the first year's role in primacy and is evaluating the possibility of accepting full primacy under the Act. The 400 community water systems in the state should be substantially upgraded under SDWA through joint cooperation between EPA and AHS. Ninety percent of these supplies serve less than 500 people, and many have no full-time operators.

Field inspections, planning, specification and engineering reviews, laboratory analyses, and municipal technical assistance are all functions carried out by the state program. Additionally, the state is developing a program which will satisfy all requirement of the SDWA. Activities carried out in this developmental stage include the preparation of legislation to ensure state water supply standards which are compatible with federal regulations, certification of laboratories which perform

analyses of potable water, sanitary surveys, and a compliance program to ensure adequate performance standards of existing and future water supply facilities.

Priorities for ensuing years will be directed toward ensuring that Vermont sucessfully accepts primacy for implementing provisions and regulations under the Safe Drinking Water Act. To aid the state in this function, EPA Region I's water supply program will be providing surveillance and analysis support as well as technical assistance as the dimension and complexity of the state's pre-primacy workload increases. As the non-community sources of potable water are identified and inventoried, pursuant to SDWA requirements, they will come under the rules and regulations of SDWA. This will occur sometime in 1979 and will result in a substantial state level of effort on the part of Vermont's water supply program personnel, since many towns and non-community supplies will encounter financial difficulties upgrading their supplies to meet federal standards. In addition, variances and exemptions from the act and its accompanying regulations will require detailed processing, further increasing the program's workload under primacy.

B. Workforce Profile

The Vermont Water Supply Program has an organizational structure as shown on the chart at the end of this section.

As shown, Water Supply responsibilities are divided between two agencies, AEC and AHS. Table IX depicts the current staffing level of AEC's water supply program.

TABLE IX

AGENCY OF ENVIRONMENTAL CONSERVATION

Water Supply Program
Current (1976) Staffing Level

Position	1976
Engineer	
Environmental	2
TOTAL	2

TABLE X

AGENCY OF HUMAN SERVICE

Water Supply Program
Current (1976) Staffing Level

Position	1976
Engineer	
Civil	2
Sanitary	2
Sanitarian (Field Inspector)	2
Chemist	1
EPA State - Assignee	1
Secretary	2
TOTAL	10

Table X depicts AHS's current water supply staffing level. Additionally, AHS's water supply program has full-time laboratory analysis capabilities. Its staffing level is profiled in Table XI. This laboratory conducts both chemical and bacteriological analyses of all samples gathered by the program.

TABLE XI

AGENCY OF HUMAN SERVICES

Water Supply Laboratory
Current (1976) Staffing Level

Position	1976
Chemistry Supervisor	1
Chemist	2
Microbiologist Supervisor	1
Microbiologist	1
Secretary	1
TOTAL	6

Total person-years devoted by Vermont's Water Supply Program to SDWA activities have been estimated to be 22.5 for 1977. Currently, the state of Vermont is receiving a $170,600 grant from EPA Region I to help it establish and administer a water supply program compatible with the provisions of the SDWA. During the second half of FY 1976, the program received an initial grant totaling $75,000. Specifically, Vermont may use these federal funds to: 1) formulate and adopt state drinking water standards at least as stringent as EPA's federal standards; 2)adopt a program to certify laboratories performing drinking water analyses; 3) conduct surveillance programs, such as sanitary surveys of water systems which details information necessary to the granting and review of variances and exemptions to public water supplies; 4) review the design, construction, or modification of drinking water treatment facilities; 5) establish enforcement programs adequate to assure that individual water supplies perform adequately; and 6) set up and operate the data-keeping and reporting programs required by EPA regulations.

At the local level exact workforce statistics for the number of water supply operators were available only in aggregate form. It has been estimated that within the entire state, about 250 person-years are devoted to local water supply functions. The workforce involved in water supply matters numbers 450 which translates into a little less than a half person-year devoted by an individual charged with water supply responsibilities. Thus, of 400 community systems, many have no full-time operators. Generally, individuals who work in local supplies are employed by local Departments of Public Works and have duties which extend beyond water supply matters. The size of the workforce devoted to individual supplies ranges from a high of 10 to 15 individuals to a low of only one individual employed part-time on a limited basis.

C. Workforce Projections

Recent growth in the water supply program within the Agency of Human Services has been almost entirely associated with funding under the SDWA; within the past two years, three professionals have been added to the staff. If the state assumes primacy, it has been estimated that the program will need about four more people to ensure adequate operation. Specific growth through 1981 will be totally dependent on financial assistance available from EPA under SDWA. State funding of the water supply program is not likely to grow due to priority commitments to wastewater treatment facility construction grants and water quality planning.

Table XII depicts Vermont's projected budget and staffing level commitments for FY 1977 and FY 1978.

TABLE XII

STATE OF VERMONT

Water Supply and Pollution Control Commission
Cost and Workforce Estimates for Safe Drinking
Water Act Implementation - Fiscal Years 1977 and 1978

	State Share	Federal Share	Total	Person-Years
FY 1977	$176,200	$170,600	$346,800	22.5
FY 1978	$176,200	$210,000	$386,200	24.5

As can be seen, no increases in state funding are projected. It has been suggested that the potential addition of two positions (full-time equivalent) will be utilized for community system compliance with regulations promulgated under SDWA pursuant to the state's acceptance of primacy. Projections beyond FY 1978 would be speculative, and actual state level workforce growth will be a function of the growth in federal funding.

At the local level, growth in the numbers of operators will be approximately 25% over the next five years. It has been estimated that 10 new water supplies will be registered wtih the state on a per annum basis over the next 5 years.

Eventually, as a result of SDWA, extensive treatment and monitoring will be required of all water supplies in Vermont. As a result

of this, it is projected that 75% of all systems will eventually require at least one full-time person to ensure proper operation and treatment. Additionally, it seems inevitable that present certification requirements will be extended to include any and all individuals operating local registered (public and private) supplies.

Finally, if the new Toxic Substances Control Act impacts water supply monitoring, a transition to a more experienced and knowledgeable water supply workforce at both the state and local levels will be required.

D. Training and Certification

In Vermont, all persons operating or in responsible charge of a public water treatment plant in the state are registered with and certified by the Division of Water Supply of the Agency of Human Services. This requirement has been in effect since August, 1974. It was initially promulgated in August of 1971; however, only recently were the bulk of water treatment plant operators certified during an intensive training-exam session. Formal training is not a prerequisite for operator certification.

Written examinations for water treatment plant operators certification are held in the office of the Division for those persons desiring to take the examination for certification or any other place designated by the Division. Operators with 10 or more years of continuous operation experience in the same plant can receive a restricted certificate for the plant in which they work without taking an examination.

An applicant's registration and certification status is determined by the grade made on the examination, educational background, and water treatment plant operation experience. A grade of not less than 70% is considered passing.

Additionally, the minimum registration and certification requirements of each applicant with regard to education and experience is shown in Table XIII. Note that operators employed prior to August 1971 who did not have the required educational qualifications were issued a restricted certificate if all other requirements were satisfied.

TABLE XIII

STATE OF VERMONT

Water Treatment Plant
Operator Registration and Certification Requirements*

Operator 1st Class - High School education, or equivalent, and pass written examination. Mimimum water treatment plant operation experience required, four years.

Operator 1st Class (Restricted) - High School education, or equivalent, and pass written examination. Minimum water treatment plant operation experience required, three years.

Operator 2nd Class - High School education, or equivalent, and pass written examination. Minimum water treatment plant operation experience required, two years.

Operator 2nd Class (Restricted) - Minimum of high school education, or equivalent, and pass written examination. Minimum water treatment plant operation experience required, one year.

Operator 3rd Class - High School education, or equivalent, and pass written examination. Minimum water treatment plant operation experience required, six months.

TABLE XIII
(continued)

Operator 4th Class - 8th grade education and pass written examination. Minimum water treatment plant experience required, one month.

* Successful college education in engineering, chemistry or bacteriology may be substituted on the basis of one year's education for one year's experience, provided at least one month's experience in a public water treatment plant is included.

The successful completion of a Water Treatment Plant Operator's Training Course approved by the Division or a correspondence course in water plant operation approved by the Division may be substituted for the experience requirements provided that such substitution of training courses or correspondence courses shall not be substituted for more than six months of the required experience.

Requirements for operator certificates of registration for operating individual water treatment plants are as follows:

Operator 1st Class - Each public water treatment plant serving a population of 25,000 or more, and where complete water treatment practices such as coagulation, sedimentation, filtration and disinfection, and where bacteriological and/or chemical control tests are conducted shall have at least one 1st class operator on duty at all times the plant is in operation.

Operator 1st Class (Restricted) - A certificate of this class is restricted to a specific public water treatment plant utilizing complete water treatment and bacteriological and/or chemical control tests serving a population of 25,000 or more.

Operator 2nd Class - A certificate of this class is required for those public water treatment plants utilizing complete treatment and bacteriological and/or chemical control tests and serving a population of 5,000 to 25,000 or when working in a public water treatment plant serving over 25,000 people, but under the supervision of a 1st class operator.

Operator 2nd Class (Restricted) - A certificate of this class is restricted to a specific public water treatment plant utilizing complete treatment and bacteriological and/or chemical control tests and serving a population of 5,000 to 25,000.

Operator 3rd Class - A certificate of this class is required for those public water treatment plants utilizing complete treatment and bacteriological control tests and serving a population of 5,000 or less or when working in a public water treatment plant serving 5,000 to 25,000, but under the supervision of a second class operator.

Operator 4th Class - A certificate of this class is restricted to public water treatment plants utilizing disinfection and/or corrosion control practices only.

Operator Trainee - A certificate of this class is limited to new personnel without any prior experience as a water treatment plant operator.

Application for a trainee certificate is made to the Division within one month after employment as an operator. Operators under this certificate must be under the supervision of a legally certified operator. Trainee certificates shall be valid for one year only.

TABLE XIV

STATE OF VERMONT

Selected Water Supply Training Programs

Type of Educational Program	Sponsoring Agency	Duration and/or degree
Civil Engineering (environmental engineering - emphasis on water, wastewater, air pollution, and solid wastes)	University of Vermont, Burlington	Bachelor of Science and Master of Science in Civil Engineering
Environmental Studies (emphasis on water, environmental science, lab, environmental management)	Johnson State College, Johnson	Bachelor of Science in Environmental Studies
Civil Engineering (emphasis on water, wastewater, and soil)	Vermont Technical College, Randolph Center	Associate in Applied Science in Engineering

TABLE XIV
(continued)

Type of Education Program	Sponsoring Agency	Duration and/or degree
CORRESPONDENCE COURSES		
Correspondence Course Manual for Water Plant Operators	Clemson Correspondence 401 Rhodes Center Clemson University Clemson, S.C. 29631	Covers South Carolina Certification Levels C & D

Finally, the EPA Office of Water Supply in Washington has developed and is implementing a thorough state and local training strategy for FY 1977. Vermont will more than likely impact many of these offerings if they so desire. Table XV lists those training packages currently being developed along with scheduled dates of availability.

E. Career Potential

The largest number of careers will develop at the local level as the demand for skilled treatment plant operators increases. Moreover, stricter regulations will be required for new plants as new regulations are promulgated pursuant to SDWA. Accordingly, the caliber of operators will be required to increase. Within the state program new career openings will proceed at a reduced pace after 1979 as the program achieves full implementation status. Any impact from toxic substances control is likely to result in an increased demand for public water toxicologists at the state level.

TABLE XV

TRAINING PACKAGES CURRENTLY BEING DEVELOPED BY THE OFFICE OF WATER SUPPLY UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, UNDER PHASE I OF ITS NATIONAL TRAINING STRATEGY WHICH COULD IMPACT THE STATE OF VERMONT

1. Safe Drinking Water Act (1974) implementation workshops and materials for local operators and officials.

   - available March 1977

2. A basic operator training course for entry-level water supply personnel designed for delivery by state education institutions and agencies.

   - available summer 1977

3. Laboratory certification courses for regional and state personnel involved in certifying chemical and bacteriological laboratories.

   - available early 1977

4. Laboratory methodology courses in approved testing methods for regional, state, and local laboratory technicians.

   - available summer and fall 1977

5. Sanitary survey courses in the methodology involved in surveying small water supply systems as well as more complex systems.

   - available October 1977

6. Public notification short course for local suppliers to aid in handling public notification procedures.

   - available summer 1977

7. Variances and exemptions course for state personnel to determine procedures involved in such instances under SDWA (1974).

   - available summer 1974

8. State training program management course for regional and state agency personnel in training planning.

   - available spring 1977

F. Conclusion

The water supply program of Vermont appears to be willing to accept primacy under the Safe Drinking Water Act provided that the necessary legislative initiatives can be established. State funds to support primacy, however, will most likely not be on the increase in the immediate future; thus, a potential inequality of responsibilities and resources could arise with the assumption of primacy and its responsibilities. The state certification program for water supply operators appears as if it will be upgraded in the near future to include water supply operating personnel who work at supplies which contain no treatment facilities.

The most crucial issue facing Vermont and the other five New England states is centered around EPA's commitment to provide substantial amounts of funding to support state water supply programs which decide to accept all delegations of authority under SDWA. With the current outlook showing a negligible growth in projected state funding to support primacy, the success of the program in New England will be dependent upon the extent of regulatory requirements and the degree to which EPA is willing to ensure satisfactory compliance through increased state program grants.

VERMONT WATER SUPPLY PROGRAM

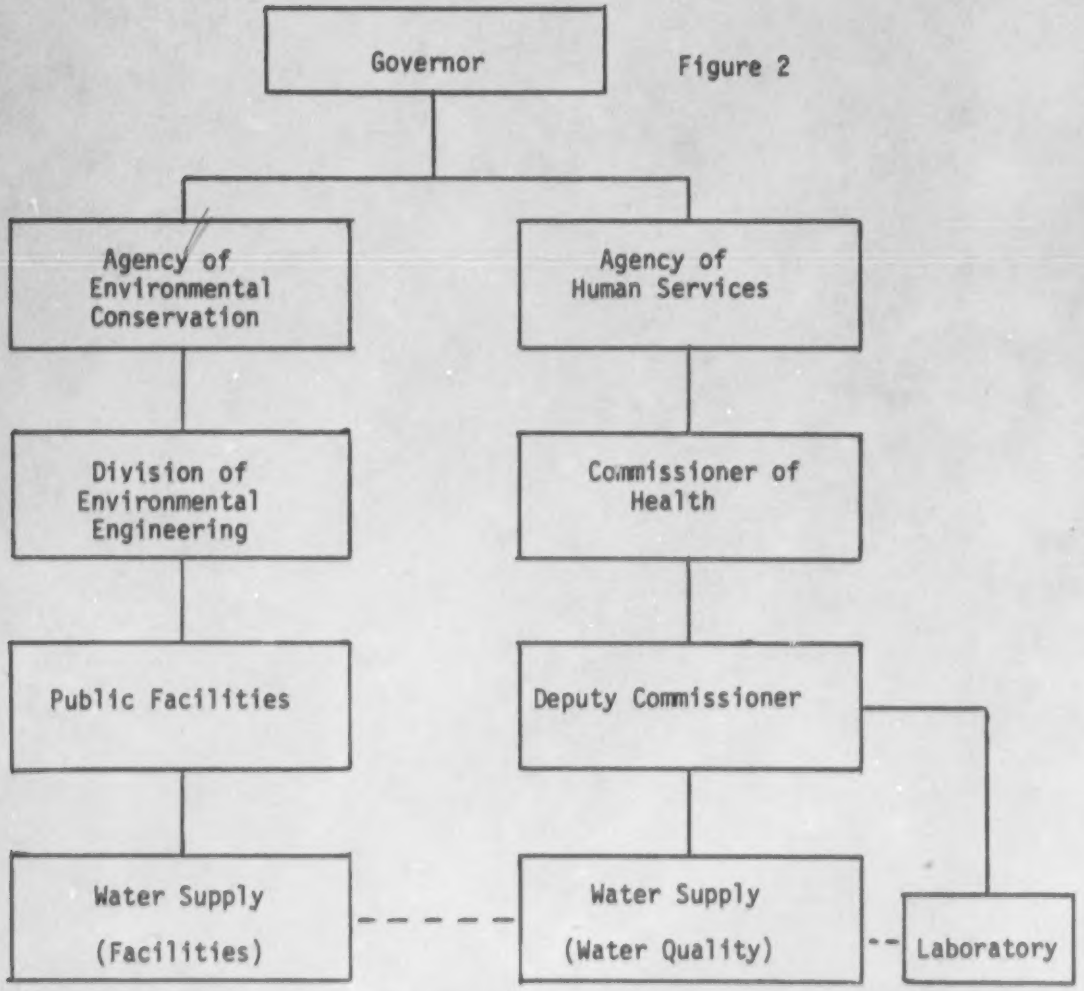


Figure 2

V. RADIATION

A. Introduction

Environmental Radiation Control in the State of Vermont is the responsibility of the Division of Occupational Health of the Vermont Department of Health. The objectives of the State Environmental Surveillance Program are:

1) to verify the adequacy of control of radioactive effluent releases to the environment;

2) to provide data to estimate population exposure to ionizing radiation;

3) to establish an "Emergency Action Plan" in the case of a nuclear accident.

The program is primarily directed toward surveillance around the site of the Vermont Yankee Nuclear Power Plant in Vernon, Vermont, but also includes several sampling points in other parts of the state to provide background (baseline) information for comparison purposes. Insofar as possible, sampling and analytical methods are compatible with other state and federal governmental agencies involved in similar surveillance activities and data is exchanged regularly. Cooperative sampling programs have been established with the United States Public Health Service and with the States of Massachusetts and New Hampshire.

Currently within Vermont there are 350 X-ray facilities and, on an annual basis, about 1,000 people are occupationally exposed. Vermont regulates the transportation of all radioactive materials within its boundaries. The state has recently developed a comprehensive emergency response plan.

B. Workforce Profile

The Radiation Control Program of the Department of Health has the organizational structure as shown on the chart at the end of this section.

Table XVI is included to depict current staffing levels of the Environmental Surveillance Program.

TABLE XVI

VERMONT DEPARTMENT OF HEALTH

Division of Occupational Health
Radiation Program
Current (1976) Staffing Level

Position	1976
Director *	1
Radiological Health Specialist	1
Laboratory Chemist	1
Laboratory Technician	1
TOTAL	4

*estimated to devote 10% of time to environmental radiation matters.

In the private sector Vermont Yankee represents the only nuclear power generating installation in the state. It has been estimated that 213 person-years of technical and professional work are spent on environmental monitoring and analysis.

C. Workforce Projections

It is anticipated that there will be no increases in the current staffing level over the next five years due to Vermont's austere fis-

cal situation. Additionally, there are no new nuclear facilities planned for the state. The current environmental surveillance activities are not likely to increase in the near future.

D. Training and Certification

Training offered for Vermont Radiation Program employees is limited due to the lack of available resources for financing. Generally, most individuals in the program actively participate in various professional societies and as a result keep in tune with the current state of the art of Environmental Radiation Control. At this time the program is looking into the possibility of securing "agreement status" with the Nuclear Regulatory Commission. Section 274 of the Atomic Energy Act allows the Commission to delegate to the states regulatory authority over nuclear material shipments in quantities not capable of attaining a critical mass. A state which has a program capable of protecting public health can enter into an agreement whereby they assume the aforementioned regulatory authority. Extensive training programs conducted by NRC are available to personnel by agreement status.

E. Career Potential

Due to the projected level of no growth in the state's Environmental Surveillance Program, no potential areas for the development of new careers can be identified.

F. Conclusion

Due to its previously established workforce posture, the Vermont State Environmental Radiation Program is currently operating at a level as near to full capacity as state finances will allow. Thus, with the current fiscal situation of the state, it appears likely that no new funding will be made available to the program. The potential for new careers will be slight and is further reduced by a low attrition rate, thus limiting employment openings within the program. No new nuclear facilities are scheduled which might result in workload increases and additional personnel.

VERMONT RADIATION PROGRAM ORGANIZATION

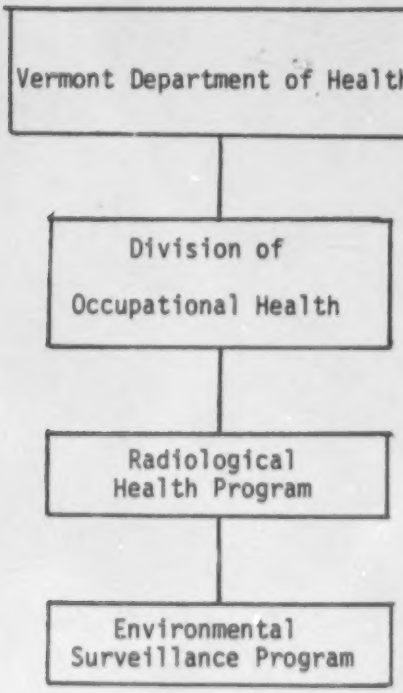


Figure 3

VI. SOLID WASTE

A. Introduction

Act Number 246 of the 1969 Adjourned Session of the Vermont State Legislature mandates that all Vermont municipalities "provide for the operation and maintenance of sanitary landfills, incinerators, or both, as the exclusive means for disposal of garbage and refuse ..." The regulatory responsibility was assigned to the Vermont Board of Health; however, the administration of the program was delegated to the Agency of Environmental Conservation (AEC). Additionally, legislation was enacted which prohibited the open burning of refuse at dumps or sanitary landfills. Both these public laws provide the basic strategy for Vermont's solid waste management program.

Within the state there are 103 disposal facilities, half of which are designated as environmentally acceptable, having been located, designed, and operated in accordance with regulations promulgated by the Solid Waste Program of the AEC. Table XVII, provided by the Solid Waste program staff, summarizes Vermont refuse disposal.

TABLE XVII

VERMONT REFUSE DISPOSAL

Methods of Disposal	No. of sites	Population	%	No. of Towns Affected
Environmentally Acceptable Sanitary Landfills	49	308,006	69	179
Sanitary Landfills (Grandfather)	11	99,633	22	20
Incinerators	2	1,390	--	2
Total using approved methods	62	409,029	92	201
Dumps	40	35,301	8	45

"Grandfather" sanitary landfills are areas for disposal that have been converted from open dumps and do not meet current environmentally acceptable guidelines. This is due, in part, to leaching problems which generate considerable localized water pollution. These sites service 22 percent of Vermont's population, including three of the state's largest municipal regions.

Finally, there are forty sites in the state which have not been approved as sanitary landfills. These dumps generally serve smaller towns (population less than 1,000) and cause a considerable amount of local ground and surface water pollution. Table XVIII, also provided by the solid waste program, shows the state's progress over the past seven years toward establishing environmentally sound sanitary landfills throughout the state. Table XIX diagrams the approval process for establishing an environmentally acceptable sanitary landfill.

TABLE XVIII

STATE OF VERMONT

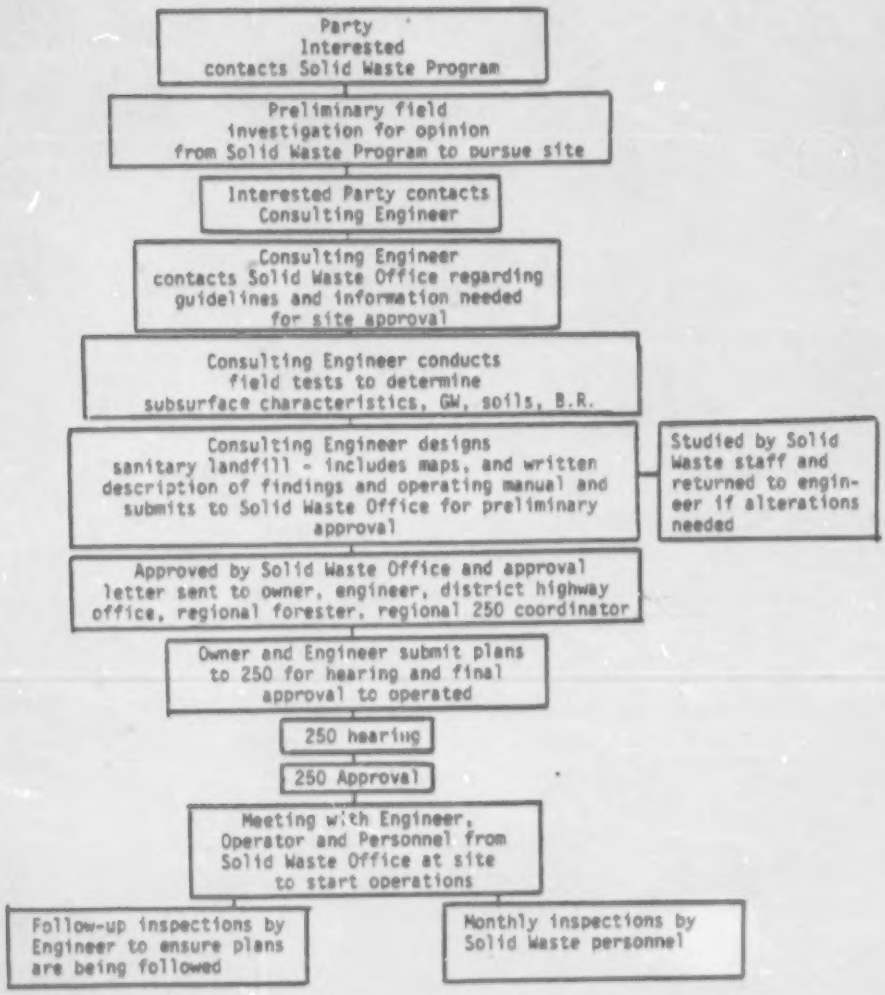
Sanitary Landfill Growth, 1970-1977

	1970	1972	1974	1975	1976	1977
Environmentally acceptable sanitary landfills	--	22	27	46	49	55
Remaining approved (Grandfather) landfills	8	25	23	12	11	8
Open dumps	156	63	57	50	40	35
Approved incinerators	--	--	1	2	2	2

Current program activities cover a wide range of methods to combat the problem of solid waste disposal. The solid waste program has identified three major areas of concern: 1) resource recovery; 2) incineration; and, 3) sanitary landfills.

TABLE XIX

FLOW DIAGRAM APPROVAL PROCESS OF SANITARY LANDFILLS


Party Interested contacts Solid Waste Program
Preliminary field investigation for opinion from Solid Waste Program to pursue site
Interested Party contacts Consulting Engineer
Consulting Engineer contacts Solid Waste Office regarding guidelines and information needed for site approval
Consulting Engineer conducts field tests to determine subsurface characteristics, GW, soils, B.R.
Consulting Engineer designs sanitary landfill - includes maps, and written description of findings and operating manual and submits to Solid Waste Office for preliminary approval
Studied by Solid Waste staff and returned to engineer if alterations needed
Approved by Solid Waste Office and approval letter sent to owner, engineer, district highway office, regional forester, regional 250 coordinator
Owner and Engineer submit plans to 250 for hearing and final approval to operated
250 hearing
250 Approval
Meeting with Engineer, Operator and Personnel from Solid Waste Office at site to start operations
Follow-up inspections by Engineer to ensure plans are being followed
Monthly inspections by Solid Waste personnel

The first activity, resource recovery, has proceeded at a good pace given the rural nature of the state. In 1973, AEC published a resource recovery plan which outlined a statewide plan for source separation of recyclable materials, their processing and ultimate re-use. However, due to a lack of legislative appropriations and a non-profitable secondary materials market, the plan was not implemented. Future strategieswill seek to implement a limited, regional program.

Currently local initiatives have created a local volunteer recycling program in Bennington and Berkshire counties, both in the southern part of Vermont. Approximately 300 tons per year of glass, cans, and newspapers are sold to a commercial secondary materials firm. Rutland and Chittenden counties participate in limited source separation activities as described in Table XX.

TABLE XX

RESOURCE RECOVERY ACTIVITIES IN VERMONT

Location	Type	Output	Status
Bennington-Berkshire Counties	Local volunteer recycling program	Reclaimed materials	Operational
Chittenden County	Crankcase Oil Recycling Program	Reclaimed Oil	Operational
Rutland	Reynolds Aluminum mobile recycling unit pickup site	Reclaimed aluminum cans	Operational

Unless the market for secondary materials improves within the state of Vermont, extensive, statewide resource recovery activities will not be an economically feasible undertaking for the future. The only alternative for implementing a comprehensive statewide program would be to subsidize

a program by either EPA or the state legislature, the latter being a remote possibility.

In April of 1972, Vermont enacted a comprehensive statewide beverage container law which provided for:

1.) A minimum deposit of 5 cents for all beer and soft drink containers.
2.) A handling charge of 20 percent of the deposit to be paid by the manufacturer or distributor to the retailer.
3.) A label on each container clearly indicating the amount of the deposit and naming the state in which the deposit is valid.
4.) The ability to establish (by any person) a centralized deposit collection facility away from a retail store. These facilities can be either deposit exchange operations or complete recycling centers.
5.) A penalty for violation of the law.

On July 1, 1975, these provisions were extended to include the following requirements:

1.) Labels on beverage containers shall clearly state the amount of the deposit and carry the word "Vermont" in not less than one-quarter-inch type size. Labels on metal cans must be on the top of the container. Refillable containers are exempted from the labeling requirements. This section became effective September 1, 1975.
2.) Non-refillable glass containers are banned, as are detachable parts of metal cans (pull tabs) and containers connected to each other by plastic rings or similar nonbiodegradable devices. This section became effective January 1, 1977.
3.) An educational program for the public is established. Store redemption hours can be posted. These provisions became effective July 1, 1975.

Vermont did not suffer any job losses from passage of the bill. In fact, 100 positions were added in the retail sector, primarily at the unskilled level. This stems from the fact that there are no bottle or can manufacturers within the state vulnerable to a decrease in production of non-returnables. To date, retailers have had the option of recycling the returnable containers or depositing those non-reusable bottles into area landfills.

The second activity in which the Solid Waste Management Program has been involved is municipal incineration. Only two towns in the state presently use incinerators and both contain populations smaller than 1,000. Due to the cost of maintaining an incineration facility, which is higher than operating a sanitary landfill, burning refuse is not anticipated to grow to any degree in the foreseeable future. However, the Solid Waste Division will continue to assess this approach to waste disposal as there are areas within Vermont which do not have potential landfill sites and these localities are approaching a point where disposal facilities must be developed. In these circumstances, incineration looks to be the best alternative.

Finally, the third activity of the state program is the operation of a statewide sanitary landfill development program. In the not too distant past, dumps were usually located in area swamps or gravel pits prior to the realization of problems associated with this method of facility siting. With the recent fast-paced technological development of environmentally safe and proper sanitary landfill engineering practices and principals, the agency has developed regulations regarding what constitutes an environmentally sound disposal site. Compacting, daily covering, cover types, and groundwater protection have recently been addressed as well as the problem of social acceptability of landfill location. Unfortunately, it is becoming increasingly difficult to find a site that is environmentally acceptable since suitable land generally has developmental or agricultural potential. However, a public education awareness program has been initiated by Solid Waste Program to stress future uses of closed sanitary landfills. Because of the quality of land needed for the operation,

when a site is closed it can be reclaimed for either recreational or agricultural uses, thus destroying the myth that the land is gone forever.

Currently, the Agency of Environmental Conservation is developing a comprehensive state solid waste strategy to address the following sectors known to generate substantial amounts of waste:

1.) Municipal, commercial, and institutional waste,
2.) Industrial waste, including hazardous waste,
3.) Sludges,
4.) Special waste such as used crankcase oil.

The following list of program activities has been established and will constitute Vermont's answer to a comprehensive statewide solid waste management plan.

Activity #1	Dump closing and landfill upgrading
Activity #2	Re-evaluation of legal authorities
Activity #3	Ground water monitoring program
Activity #4	Development of a hazardous waste management program
Activity #5	Resource Recovery
Activity #6	Sludge disposal

The following activity descriptions were provided by the Solid Waste Program and portray strategy designed to meet federal requirements promulgated under the Resource Conservation and Recovery Act of 1976.

Activity 1 - Dump Closing and Landfill Upgrading

The prime emphasis of the solid waste management program will be to close open dumps and ensure the upgrading or closing of marginal sanitary landfills. Sanitary landfills still appear to be the most satisfactory method, both economically and environmentally, to dispose of solid waste within the State.

There will be a continued program to upgrade land disposal sites with poor engineering plans, or those with no engineering plans which as a result are polluting either the ground or surface water. An engineering evaluation must be made of these landfills and engineering plans developed to correct these deficiencies in site design. If as a result of the engineering evaluation, it is determined that continued operation of the landfill will result in environmental damage and cause significant water pollution problems, a closure schedule will be developed between the Agency and the operator of the landfill. Duration of the schedules should not exceed three years.

Activity 2 - Re-evaluate Legal Authority

There is a need to re-evaluate and develop the legal authority to implement a comprehensive solid waste management program, including the proposal of comprehensive solid waste management legislation to the 1977 session of the Legislature; the re-evaluation of existing regulations; and, the refinement of draft sanitary landfill guidelines. Since the passage of the State's first landfill legislation, there have been significant changes in technology, and problems, such as the disposal of industrial and hazardous waste, have been recognized. Adequate authority for the Secretary of the Agency of Environmental Conservation to regulate these hazardous and industrial wastes must be adopted. The proposed legislation, however, should be mindful of major Federal legislation which is pending, (i.e., the Resource Conservation and Recovery Act of 1976).

Activity 3 - Ground Water Monitoring Program

A ground water monitoring program is a viable means of monitoring quality and quantity of water in various aquifers throughout the state.

The state of Vermont is classified as rural with the use of ground water very high. Ground water in the state is used by 100 percent of the population at one time or another and 60 percent of the people depend primarily upon ground water for drinking water.

The main concern of the Agency is contamination of ground water caused by sanitary landfills and dumps. Refuse can contribute many potentially lethal contaminants to the ground water system. All new sanitary landfills since late 1973 have been required to establish monitoring wells with regularly scheduled testing programs for the detection of any contaminants.

The troublesome characteristic of ground water is its slow movement down the hydraulic gradient and its consequent inability to attenuate any contaminants by dilution. It is possible for a high concentration of pollutants to be introduced to the ground water system and not be detected at a home well 200 yards down gradient for ten years or more and, presently, it may be too late to improve the quality of the water. With a monitoring system, problems such as this could be detected before they caused any problems.

Activity 4 - Development of a Hazardous Waste Management Program

The hazardous wastes survey will be continued and updated and a summary report concerning the amount and kind of hazardous wastes generated will be issued. Though it is anticipated that Vermont will have only a few hazardous waste disposal problems, experience has indicated that these may often be of a serious nature. Thus the agency has taken a cautious attitude regarding hazardous wastes and the need for the development of a comprehensive program in this area.

Activity 5 - Resource Recovery

The prospects for resource recovery in Vermont will be continually evaluated. As soon as stable long term markets exist for recycled materials

or markets can develop, efforts will be directed toward implementation of a resource recovery program. In addition, the prospect of utilizing refuse derived fuel in Vermont boilers will also be evaluated on a continuing basis.

The existing used crankcase oil recycling program in Chittenden County will be expanded to other portions of the state if possible. Initial surveys of sources of used oil have already been initiated.

Activity 6 - Sludge Disposal

The impetus for dealing with the problem of ultimate sludge disposal has been provided (1) historically by the necessity of removing accumulated solids from the treatment process for wastewater and disposing of them in an acceptable manner, (2) recently by the EPA requirement that all municipalities receiving grants for new wastewater treatment facilities obtain prior approval from the Vermont Agency of Environmental Conservation for sludge disposal procedures and (3) by constant concern over the utilization of sludge and other residual materials as resources rather than wastes.

With the exception of the recent projects for which each step of ultimate sludge disposition is approved by the state, all existing facilities have met their needs as required, most with no advice or consultation from state regulatory bodies. Examples of the means employed in the past, and to some extent those still used by many operators of the smaller wastewater treatment facilities, especially those with drying beds, include disposal at the facility site, use on golf courses to enhance turf, use by individuals for residential flower gardens, landfilling, some smaller scale agricultural use and use on municipal horticultural projects.

The emphasis in sludge utilization is shifting to agricultural areas, with most new facilities being designed so that liquid sludge can be drawn directly from holding tanks and transported to the sites.

During the past fiscal year, the State of Vermont has been actively engaged in a program to develop legal and technical guidelines for sludge disposal which are based upon the EPA technical bulletin entitled, MUNICIPAL SLUDGE MANAGEMENT, ENVIRONMENTAL FACTORS. During the same period of time, approximately 20 sludge disposal/utilization projects have been reviewed and approved.

The possibilities for sludge utilization on a long-term basis are numerous and to ensure that the best alternatives and approaches are taken, program officials feel that the following must be accomplished:

1.) Preparation of a comprehensive inventory of sludge types and volumes as well as disposal procedures, costs, and long-term results of all disposal and utilization procedures.
2.) Sampling and analysis of sludges from all treatment facilities in Vermont with special emphasis on nutrient characteristics and heavy metal concentrations. In these instances where industrial flows exist to municipal treatment facilities, efforts should be made to determine whether any potentially toxic or undesireable materials, and in what quantities, are being introduced into the treatment process.
3.) Further review of existing regulations and recommendations for desireable changes.
4.) A comprehensive literature review and establishment of a technical reference library dealing with all aspects of sludge handling, disposal and utilization.
5.) Establishment of at least one pilot project to control and closely monitor land application of sludge under a number of varying conditions including deep trenching and land spreading. Close attention should be paid to local ground water quality.

The following mechanisms will be utilized by the AEC Solid Waste Program to ensure a timely approach and realization of its state-wide solid waste management strategy:

A. Municipal-regional planning,
B. Enforcement,
C. Technical Assistance,
D. Research,
E. Public Information/Education.

The following descriptions of each facet of the proposed strategy were provided by the director of the state program. Although at times highly specific in nature, the methodology is quite comprehensive and integrated into a well-structured approach.

A. Planning

The Agency of Environmental Conservation encourages municipalities to plan for regional solid waste management facilities. The prime benefit of a regional approach is economies of scale resulting in lower disposal costs.

B. Enforcement

The Agency of Environmental Conservation is responsible for enforcing the solid waste management regulations. Despite the fact that the enforcement program has been active for a long period of time, many towns are not in compliance with state law. The agency will probably be forced to utilize legal sanctions against those towns which are unwilling to comply.

The backbone of the regulatory program is the properly designed landfill and an important part of design is the sanitary landfill design criteria. Draft guidelines have been developed by the technical staff within the Agency. The guidelines have been widely distributed in the professional and public community. Many changes have occurred as a result of comments on the draft guidelines. The last stage in the development of the guidelines prior to formal adoption is to establish a technical advisory committee to provide a final review of the guidelines.

C. Technical Assistance

The Agency of Environmental Conservation has on its staff geologists and engineers to assist municipalities in solving their solid waste problems.

The Agency will continue to provide technical assistance both to the private and public sectors in the development of solid waste management solutions.

This office is currently working with each of the ten municipalities with population in excess of 1,000 that have maintained dumps as their means of solid waste disposal. The Agency is working with many other municipalities on an individual and regional basis in order to improve their solid waste disposal methods. This assistance is provided in several ways. Representatives from the Agency provide guidance on the proper operation of sanitary landfills, the most efficient methods of compaction and covering of the refuse, and methods by which the use of a landfill may be extended as long as possible. In the course of establishing a new sanitary landfill, this office provides preliminary review of proposed sites including directing the placement and evaluation of initial soil test pits and borings which often are conducted by the Vermont Department of Highways. Assistance is provided for the economic evaluation of the solid waste management alternatives. This economic evaluation also includes initial feasibility studies for establishment of recycling programs.

D. Research

The Agency recognizes the need to research new ideas and to evaluate existing practices. Even though technology concerning refuse disposal on land has advanced over the past few years, there are some aspects about which few definite facts are known. One of these aspects is leachate production and its consequent travel into and through the ground water system. Information pertaining to this subject is available describing experiences in other localities. Unfortunately, each locality has unique geological and hydrological characteristics that can not be readily applied to Vermont. In view of this, the Vermont State Solid Waste Office undertook a research project funded by federal monies in the spring of 1975, which will be completed in the fall of 1976.

The purpose of the project is many fold. It is to determine whether or not leachate is a problem in Vermont, what ions can be expected, what are the dilutionary and attenuating effects of ground water and soils, and what migratory path does the leachate take in the ground water system, i.e., does it stay at the top of the aquifer or sink to the bottom, does the leachate spread out in a plume or does it maintain a narrow channel.

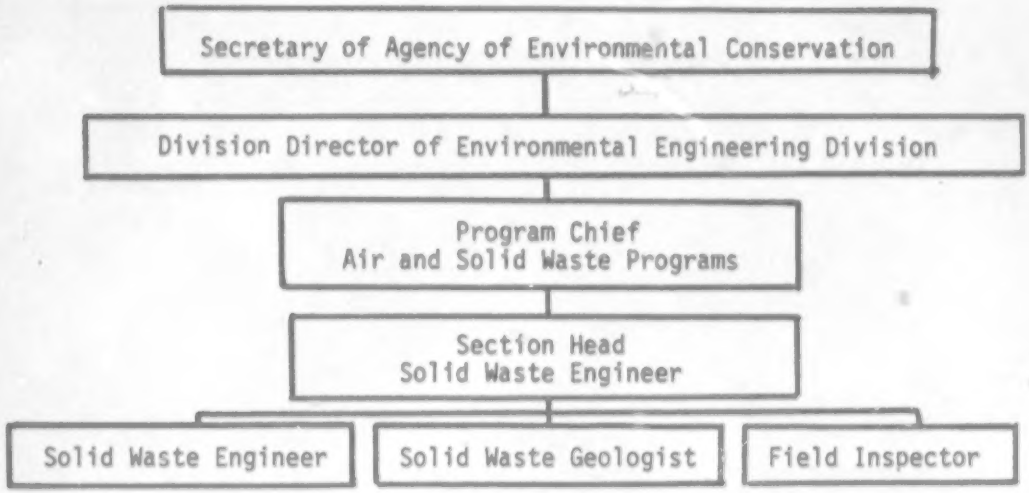
E. Public Information/Education

The Agency continually recognizes the need to provide current information concerning the state of the art in solid waste management and involves the public in its decision making process.

B. Workforce Profile

The Vermont Solid Waste Program has the following organizational structure:

VERMONT SOLID WASTE PROGRAM
ORGANIZATION



As shown, the program is located within the Division of Environmental Engineering and is currently staffed by four individuals in addition to a program chief, who has responsibilities divided between Vermont's Air Program as well as the Solid Waste Program. The following table depicts the functions of each staff member.

TABLE XXI

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION
Individual Staff Functions

Position	Function
Section Head Engineer	Overall program supervision and hazardous waste disposal
Geologist	Geophysical evaluation of all proposes sites; assistance to towns and landfill operators, enforcement actions, special studies

Position	Function
Engineer	Engineering evaluation of proposed landfills, assistance to towns and landfill operators, enforcement actions, special studies, resource recovery projects
Field Inspector	Routine inspections of all operating landfills, assistance to towns and landfill operators

In addition to the aforementioned personnel, the program also relies upon the Department of Water Resources' Water Quality Lab and the Department of Highways' Soils Lab and soil drilling crews for laboratory analysis and sampling of municipal landfills.

Solid waste disposal in Vermont is primarily managed by local governments. As can be seen below, over half the environmentally acceptable sites are municipally operated while the rest are either privately owned or operated through contractual arrangements.

VERMONT LANDFILLS (ENVIRONMENTALLY ACCEPTABLE)

Public	Private	Contract	Total
26 (52%)	19 (39%)	4 (8%)	49

Of the 62 landfills in the state approximately 45 percent are privately owned. The benefits of private landfills are numerous, and as a result they have flourished within the state. The ability to avoid the political pressure normally surrounding a municipal landfill is considered an important aspect. Secondly, the efficiency of operation is considerable, as the basis for operation is profit.

On the issue of collection, the state of Vermont believes it should be a local determination and strategies should be developed on a community/regional basis. Due to the rural nature of the state and the significant

distances between point source generation and disposal, it has been estimated that 80 percent of the entire cost of solid waste disposal is in collection and delivery. Thus, in most cases collection and delivery is the responsibility of either:

1. The private citizen,
2. The town,
3. Private contractor.

In no instances do any towns operate municipal collection services. In only a few cases do local towns contract for services. The majority of private collection is done on a commercially competitive basis and has resulted at times in the disposal of refuse in landfills not considered to be the most convenient in proximity. Finally, much collection and delivery is the responsiblity of the individual citizen. A breakdown of collection and transfer systems within Vermont can be seen below.

VERMONT COLLECTION AND TRANSFER SYSTEMS

Type	No. towns utilizing this method
Curb collection	13
Green Box System	6
Transfer Station	5
TOTAL	24

Out of 246 towns using either environmentally acceptable sanitary landfills, "grandfather" sanitary landfills, incinerators, or dumps, roughly ten percent utilize some type of private collection system as shown.

C. Workforce Projections

The impact of the new Resource Conservation and Recovery Act of 1976 is at this time unknown. Staffing level projections are indeterminable at this time and will hinge on the extent of state requirements proposed by EPA. Most assuredly, however, the major limiting factor for obtaining additional personnel to implement a federally acceptable statewide solid waste management plan will be the extent of federal funding. Although federal funding is accepted by Vermont, it is with a certain degree of reluctance due to the extensive requirements,e.g., paperwork, attached to these monies. The solid waste program views the anticipated increase in federal support as a desirable means to implement a sound hazardous waste plan and a comprehensive statewide management plan. The expected resources to be provided, although unknown in extent, will enable an increase in workforce. One estimate showed the potential five year increase in solid waste personnel to be around ten positions; however, this seemed quite speculative at best.

In the private sector, the number of landfills is not expected to increase appreciably over the next five years; thus local operator growth will probably not occur. In the area of collection, the size of the workforce is expected to decrease. As previously mentioned, competition and political pressure have, in some instances, caused refuse to be shipped long distances when a sanitary landfill might only be a few miles distant from the point of collection. It is anticipated that the impracticality of this will be realized and municipalities will begin depositing their wastes in the most conveniently located sanitary landfills. Thus, as time devoted to transportation of municipal wastes decreases,

efficiency increases, and the number of waste collection personnel required will be reduced.

D. Training and Certification

Formalized training and/or certification for state solid waste personnel is currently lacking, although it is a concensus that all professionals should be engaged in some sort of formal continuing education program. This emanates solely from the lack of available resources to fund such training. Training and/or certification for landfill operators does not exist, although technical assistance is provided by the state to municipal landfill personnel on the proper operation of a site to ensure environmental acceptability.

Comprehensive solid waste training in Vermont will likely develop commensurate with implementation of the Resource Conservation and Recovery Act of 1976, since it authorizes EPA to make either grants or contracts with state solid waste programs for developing and implementing training programs which train individuals for occupations in solid waste management. Additionally, funds should be made available under this act to train instructors and supervisory personnel to train or supervise workforce involved in solid waste disposal. It is anticipated that training goals and activities for the AEC solid waste program will be upgraded if Vermont impacts the training funds available under this act. Explicitly defined state strategies for possible solid waste training in Vermont have not at this time been approached.

E. Career Potential

Career potential in solid waste management at the state and local level may be limited over the next five years. Positions at the state level will develop pursuant to increases in funding as a result of PL 94-580. However, full implementation and funding of the Act will require individuals who possess a background relating to hazardous waste disposal. At the local level, landfills are not expected to increase appreciably and, in the private sector, the extent of careers involved in collection is anticipated to experience a substantial decrease. Opportunities for employment in resource recovery are not anticipated because of prohibitive economic costs involved in developing, initiating, and maintaining such facilities or programs.

F. Conclusion

The Solid Waste Program of Vermont's Agency of Environmental Conservation appears to have the ability to accept all delegations of authority under PL 94-580. They are currently implementing a comprehensive statewide solid waste management program aimed at hazardous waste management, sludge disposal, closure of open dumps, and upgrading of sanitary landfills. Resource recovery alternatives are also being evaluated and it is expected that, as an alternative to recycling, a move toward source reduction may be implemented through a public education process.

The outlook for careers in solid waste management in Vermont is somewhat limited. The impact of the new federal law is directed toward the profitability of recovering non-reusable wastes; however, economies of scale have left rural Vermont with little prospect of economically

feasible resource recovery. The solid waste program will continue to provide technical assistance in order to aid municipalities interested in implementing local recycling programs. Additionally, landfills within the state appear to be adequately staffed and any increases in either the number of sites or the workforce employed by present landfills is slight.

VII. WASTE WATER

A. Introduction

The Agency of Environmental Conservation (AEC) is Vermont's principal agency concerned with the management of waste water facilities. Within AEC the Department of Water Resources coordinates the state water pollution control program. The Environmental Engineering Division, also under AEC, provides the Department of Water Resources with necessary technical and engineering support and also operates the state's municipal construction grant program. AEC has requested $237,150 from EPA for FY 1977 to support its water pollution control program of which $198,900 has been awarded. These funds are being used to establish and maintain adequate measures for the prevention and control of water pollution through:

1) Planning and surveillance;

2) Enforcement;

3) Training;

4) Assistance to Local Agencies.

The Agency of Environmental Protection's greatest responsibility under the Federal Water Pollution Control Act (FWPCA), PL 92-500, is the distribution of construction grant funds to the cities and towns of the state by authority of FWPCA. Funding offered under this program currently provides 75 percent of the total cost of constructing municipal waste water treatment plants, interceptor sewers, and pumping stations. The remaining 25 percent is financed by the state and

local governments in the form of a 15 percent state match and a 10 percent local contribution.

The other major program under FWPCA is the National Pollutant Discharge Elimination System (NPDES), a permit program to regulate the amount of pollutants discharged into the waters. AEC, together with EPA,has the responsibility to set standards for the effluent limitations or the maximum amount of pollutants that can be discharged into a body of water.

The areawide waste treatment program is mandated by Section 208 of the Federal Water Pollution Control Act and stresses planning by local designated governments to find and implement solutions to their water quality management problems. Through 1976 Vermont had no designated 208 areawide agencies, however, recently all non-designated areas (the entire state of Vermont) have been included under section 208 of PL 92-500. Responsibilities for implementation of the plan were granted to Vermont's Division of Water Resources.

Specifically, the information included within Vermont's areawide waste treatment management plan will identify the following six major areas of concern in long range water quality planning:

1) Determination of the number of waste water treatment facilities needed to maintain acceptable water quality over the next 20 years.

2) Identification of the management and functional structure for implementation over this period.

3) Identification and development of a long range methodology for dealing with non-point source pollution.

4) Determination of required long-term financial arrangements of the implementing organization(s); time requirements, anticipated costs, and an environmental and economic impact statement on the area designated under the plan.

5) Definition of those methods to be utilized in disposal of sludge and treated water from those plants within its jurisdiction.

B. Workforce Profile

The Department of Water Resources, one of the main components of the Vermont Agency of Environmental Conservation, is responsible for protecting and regulating, in the public interest, the waters of the state and promoting the general welfare. Its major areas of concern encompass all aspects of water movement and storage; for example, streambank protection and dam maintenance. Chemical, biological, bacteriological and physical aspects are covered by programs concerning water quality and pollution control. To carry out its responsibilities, the Department functions through the Management and Engineering and Water Quality Divisions, and the Enforcement and Permit Sections, as delineated below.

Management and Engineering Division

The Management and Engineering Division is composed of four sections concerned with lakes, ponds, dams, streams, groundwater, and the hydrology associated with water resources management.

Water Quality Division

The Water Quality Division is composed of four sections: Planning and Management, Computer Services, Surveillance and Studies, and Oil and Hazardous Materials.

Planning and Management Section:
The major effort of this section is directed toward preparation of River Basin Water Quality Management Plans. Considerable attention is devoted to water quality conditions and public participation.

Oil and Hazardous Materials Section:
Responsible for on-scene coordination of spills develops contingency plans for accidents in Vermont's waters. Information and education program to aid in preventing spills.

Monitoring and Surveillance Section:
This section is the largest in the Water Quality Division and consists of a laboratory services unit and a field studies unit. Performs biological, chemical, and sediment monitoring. Performs compliance monitoring of all municipal waste water treatment facilities and industries. Operates water quality monitoring network of 42 stations on a continuous basis.

Enforcement Section

The Enforcement Section, under its Chief Investigator, discharges its responsibilities as the investigating and enforcement arm of the Department.

Permit Section

The Department of Water Resources has the authority to operate a permit program in accord with the National Pollutant Discharge Elimination System (NPDES). In March of 1974, the U.S. Environmental Protection Agency approved Vermont's permit system as being in accord with Section 402 of the Federal Water Pollution Control Act Amendments of 1972, and the first permits were issued in June, 1974. The State's permit program has provided the management tool necessary to insure that dischargers make timely progress toward the abatement of pollution in the waters of the State.

Administrative Section

The Administrative Section provides administrative support capabilities to all areas of the Division of Water Resources to insure effective program operation.

The Environmental Engineering Division provides engineering services both to other Agency units implementing their capital construction and maintenance programs and in technical reviews of land use and other permit applications. In general, the Engineering Division does not formulate policy, but carries out that set by the Secretary and Department Comissioners.

Public Facilities Engineering

Construction of waste water treatment facilities is supervised by weekly or bi-weekly visits to the construction sites and the normal contractual documents associated with the projects are processed by the Division. Assistance is given to the municipalities and the consulting engineers in order to secure construction in accordance with good practice and approved plans and specifications. The public facilities section also operates a mandatory certification program to insure that operators of municipal water pollution control facilities are skilled in basic operating techniques and laboratory procedures. Such basic skills are essential for the proper operation of today's advanced water pollution control facilities.

The staffing level of the Division of Water Resources is presented in the following table.

TABLE XXII

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Water Resources
Wastewater Programs
Current (1976) Staffing Level

Position	1976
Chief, Engineering and Operators	1
Sanitary Engineer C	1
Sanitary Engineer B	9
Sanitary Engineer A	5
Environmental Program Coordinator	1
Fiscal Analyst	0
Engineer B	9
Engineer A	7
Water Quality Director	1
Chief, Water Resources Lab	1
Water Resources Chemist	1
Chemist A	2
Water Quality Technician	0
Aquatic Biologist B	1
Chief Aquatic Biologist	0
Chief Investigator	1

TABLE XXII
(continued)

Position	1976
Water Resources Investigator	6
Training Sepcialist	1
Environmental Technician	5
Environmental Control Engineer	1
Cartographers	2
Administrative	8
Annual Seasonal	2
Water Resources Planner	1
Assistant Planner	1
Water Resources Permit Officer	0
General Management	1
TOTAL	68

* Clerical not included

The Public Facilities Section of the Division of Environmental Engineer has the following staffing level as depicted in Table XXIII.

TABLF XXIII

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Division of Environmental Engineering
Wastewater Programs
Current (1976) Staffing Level

Position	1976
Environmental Engineering Executive	1
Environmental Engineer C	7
Environmental Engineer B	6
Environmental Engineer A	1
Environmental Engineer Supervisor	4
Chief, Water Pollution Control	1
Water Pollution Permit Officer	1
Training Specialist	1
Stenographer	2
TOTAL	24

As shown, the total workforce of the Agency of Environmental Conservation is 92 full-time individuals. Most of the work of the Division of Environmental Engineering (about 75%) is under the auspices of the Water Resources Division.

Figures available for the waste water operator workforce in the state were only general in nature. The current number of certified operators is estimated to be 240. No breakdowns into grade categories were available. In the private sector, specific figures for the workforce devoted to pollution control and abatement were also unavailable; however, it was estimated that a minimum of 63 individuals in this sector had at least part-time water pollution control responsibilities.

C. Workforce Projections

Workforce projections for the Agency of Environmental Protection's Waste Water Staff are not easily discernible and, as one spokesman put it, "depend upon the attitude of the federal government's commitment to state grant increases...which is currently unknown." The State of Vermont is promoting an austere fiscal program which, in itself, precludes an increased state assistance to the program. For these reasons, the extent of growth or decline for the agency's water pollution control workforce remains in doubt. Level employment will more than likely be the case.

At the local level and in the private sector, operator growth has averaged 10 to 15 new entries for the previous years; this rate is expected to continue. Turnover among these individuals is low; however, the demographic character of this workforce shows that between

1978 and 1982 many current operators will be retiring and an upsurge of new entry level positions is likely to occur. Exact estimates as to the extent of this attrition are not available.

D. Training and Certification

The operator certification program of the Agency of Environmental Conservation requires that any permit for the discharge of waste into the waters of the state shall require operation and maintenance of the accompanying facility by a certified waste treatment operator. All facilities in the state must employ only operators or assistant operators who hold valid certificates. There exists no differentiation between private and municipal operators. The definitions of operator and assistant operator follow:

Operator - a person who has direct and principal responsibility for the operation and maintenance of a pollution abatement facility.

Assistant Operator - a person who works under the supervision of an operator and who has charge of or performs important operating functions including analytical testing.

Operator certificates are graded in accordance with the type, complexity, and design flow of facilities. Assistant operator cerificates cannot be more than 2 grades below that required for the operation of the facility.

Certificates are in effect for two years and can be renewed in the same grade by applications to the department 60 days prior to

expiration. Upgrade requires new applications and examinations. Applicants for renewal must present evidence to AEC showing attendance at a wastewater treatment plant operator course, a short course, or seminar within the previous two years as a prerequisite to renewal.

AEC establishes operator certification requirements for every facility in the state and these classifications of facilities are reviewed on a yearly basis. Education can be substituted for required experience to obtain operator certification.

A selected list of waste water training programs in Vermont, conducted by the Water Programs Manpower Office of Region I, is included in this section to provide an overview of various levels of formal training being offered in the state. This information is listed below by type of program and sponsoring agency. As can be seen, EPA funds a six-week program in Vermont addressing process control techniques for wastewater treatment plant operation. Additionally, Vermont's Agency of Environmental Protection has independently developed and funded eleven short courses in Waste Water Treatment Plant operation which are presented regionally within the state.

SELECTED WASTE WATER TRAINING PROGRAMS IN VERMONT

Type of Educational Program	Sponsoring Agency
Civil Engineering (environmental engineering) emphasis on water, wastewater, air pollution, and solid wastes.	University of Vermont, Burlington
Environmental Studies (emphasis on water, environmental science, lab, environmental management)	Johnson State College, Johnson

SELECTED WASTE WATER TRAINING PROGRAMS IN VERMONT
(continued)

Type of Educational Program	Sponsoring Agency
Wastewater Treatment Plant Operator Training in Process Control Techniques	Vermont Agency of Environmental Conservation, Montpelier
Civil Engineering (emphasis on water, waste water, and soil)	Vermont Technical College, Randolph Center

Not listed is an entry level 9-month technical course offered in Maine by the New England Regional Waste Water Training Institute. Vermont regularly sends individuals who require training for certification. The program is financed by funds from the Comprehensive Employment and Training Act (CETA) which provides financial support for entry-level training. Under an innovative training grant, AEC offers emergency short-courses for non-certified personnel who must assume plant operations if the current operator leaves his post. For the future, the agency is looking into developing specialized training courses in proper industrial pretreatment techniques to be delivered to private sector operators.

Training for agency personnel involved in the state's waste water program is limited due to a lack of funding. Ideally, the program would like to start new employees with intermittent training for a two-year period and extend it on a less intense basis over the lifetime of employment with the agency. Currently, there exists an

informal cooperative program with the Universities of Vermont and Norwich for state employee continuing and career education.

E. Career Potential

Extensive career potential for water pollution related employment in Vermont will likely be limited. Any new careers at the state level and the municipal/private level will arise primarily due to attrition. At the state level, turnover is approximately 10 percent per year and is highest in professional positions. At the local/private level, turnover is unknown; however, during the 1978-1982 period a substantial demand for new operators should exist due to an anticipated increase in operator retirement. With the upgrading of existing plants to secondary and tertiary treatment levels, the technical background required of new operators will be concurrent with the higher classification of these improved facilities. Finally, on-site, construction-related careers will continue to develop over the duration of facility construction.

F. Conclusion

To summarize the existing and anticipated workforce situation within the Agency of Environmental Conservation Waste Water Program, the following statement, provided by agency personnel, is included to depict the current resource situation of the program.

"Since the later part of Fiscal Year 1973 the State of Vermont has accepted responsibility to conduct the National Pollutant Discharge Elimination System, to certify final plans and specifications,

to certify operation and maintenance manuals and to certify change orders. Our experience with the assumption of these responsibilities has been favorable. We are of the opinion that it has not only developed a more harmonious relationship with EPA but has also allowed for expeditious processing of the necessary documents and a more positive control over the program at the State and local level. We would strongly encourage further delegation of construction grant program responsibility to the State. The State stands ready to assume these additional responsibilities. However, due to the constraints of the fiscal situation in the State of Vermont, additional funding through H.R. 9560 would be necessary for maximum delegation acceptance. The State of Vermont strongly feels the proper role of EPA is to establish statutory framework and guidelines for the conduct of the programs and the responsibility for the implementation of the program should rest with the State....

Unfortunately, we do not feel that at this the resources are available to accomplish all of these objectives without diverting resources from basic program elements to accomplish these activities. We look for support out of EPA through the vehicle of a conditional 106 Program Fund, Special Grants, or the use of state assignees fully funded by EPA....

Additionally, resource constraints have curtailed our ability to provide properly for the enhancement of the education of our staff in all facets of the program. We feel it necessary that we seek assistance from EPA and other sources to continue the upgrading or existing staff in advanced waste treatment while training new people in such things as value engineering, environmental assessment, public participation, and other like elements of project development....

During this period of constraints funds it will be essential for the program to retain its credibility through accomplishments which are easily identifiable by the public rather than those which are measureable only through laboratory analysis. Evaluation of this situation will be made during the first part of this fiscal year and may result in the need for the alteration of the dates for accomplishing degrees of treatment beyond secondary while we devote our immediate effort toward removing the raw sewage from the waters of the State."

VIII. ENERGY

Vermont's energy usage is, to a great extent, for space heating requirements which far exceed the national average. Industry in Vermont tends to be non-energy intensive as many firms which require large amounts of energy have moved to warmer climates, closer to energy sources or gone out of business because of crippling accelerating energy costs. Energy costs in Vermont are double the national average, exclusive of the New England region. Vermont suffered its share of New England's 11.4% drop in industrial production following the 1973 oil embargo (the national decline was 3.8%). Many people in Vermont, along with their counterparts throughout the region, feel that only if natural gas prices are raised to comparability with oil prices can any degree of parity for New England production costs and production costs in the rest of the nation be realized.

Hopes and strategies for future energy planning for Vermont are based on the philosophy that conservation measures must be stringent and accompanied by no contradictory penalties such as higher rates for low energy users. Joint ownership with Canadian provinces of hydroelectric facilities is a long-range hope. One short-term effort planned in Vermont is the conversion of a Green Mountain Power Company small electrical generating plant from oil to wood. The projected effects of these efforts are depicted in the graph at the end of this section prepared by the Federal Energy Administration, Region I.

Vermont has one nuclear powered electrical generating plant at Vernon, operated by Vermont Yankee Power Corporation, which generates 514 megawatts. No plans are underway at this time for more nuclear plants.

The Vermont State Energy Office was created by Executive Order in 1973 and made permanent by the legislature in the 1974 session. The 1976 staffing level was six persons. Responsibilities and projects have included:

1) Creation of a comprehensive energy program to include conservation of present resources, research and development of alternative energy sources, and planning for the most efficient and effective use of present and future energy resources;

2) Development of educational programs for Vermont schools in energy conservation;

3) Development of an energy conservation program for businesses employing 100 or fewer persons;

4) A study of energy consumption on Vermont farms;

5) Participation in the New England Energy Management Information System;

6) A study of utility rate structure;

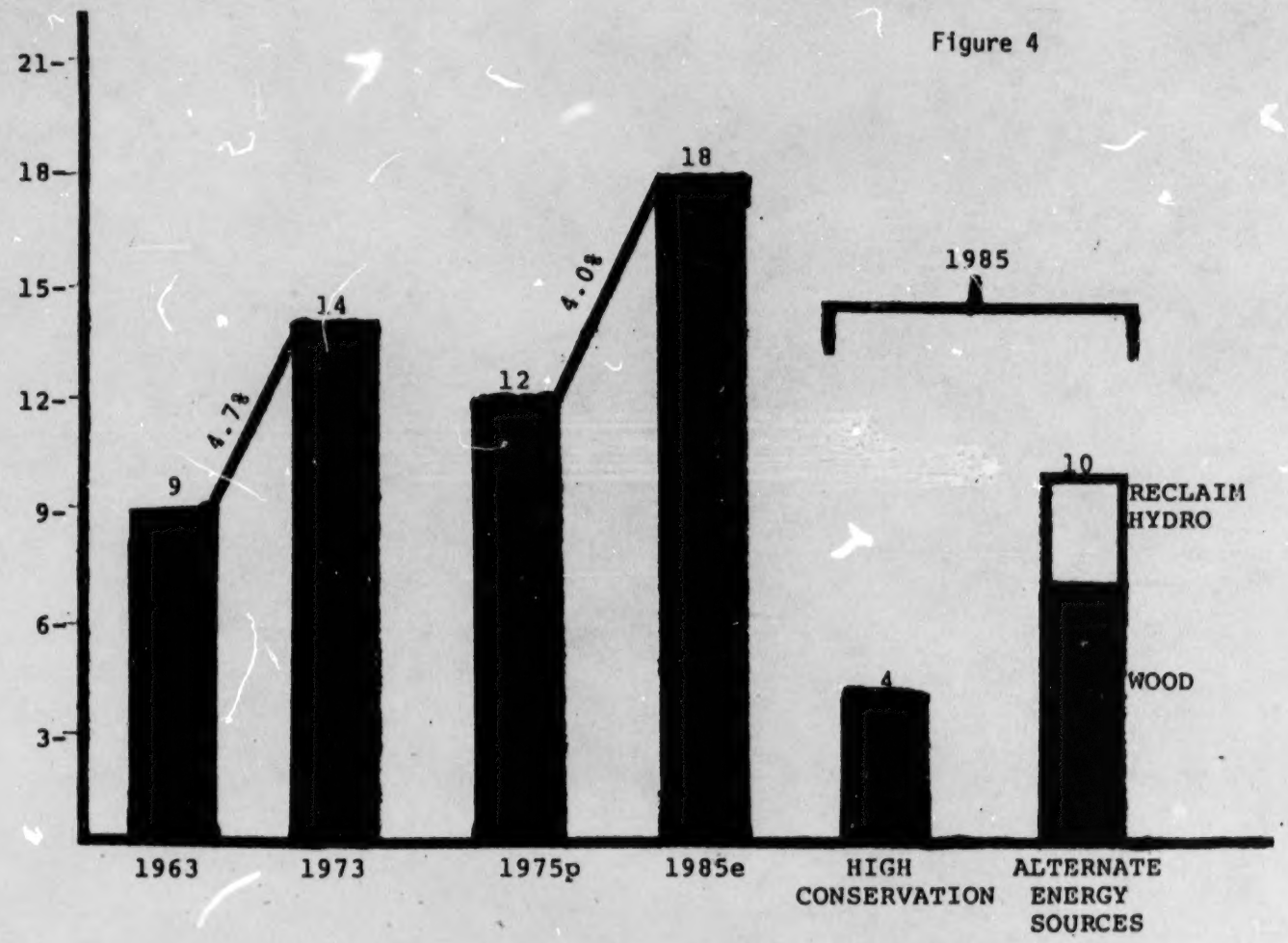
7) A feasibility study of conversion from oil to wood burning for electrical generation;

8) Studies of alternative energy sources.

OIL USE AND POTENTIAL SAVINGS
VERMONT

MILLIONS OF BARRELS
OIL EQUIVALENT

Figure 4



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Selected Post Secondary Institutions With Formal Environmental Energy Programs

There are several colleges and universities in Vermont which offer programs in environmental science and pollution control technology. Information on these programs was gathered from college catalogs selected on the basis of recommendations by professionals in the field and phone calls to department heads. Only a small percentage of the schools in the state were included in our sample; thus, the programs outlined in the section simply represent the kinds of pollution control training available in the state at the two-year, four-year, and post graduate college levels. These programs are designed to prepare students for technical or professional positions in pollution control and related areas.

Included in this section are Marlboro College which offers a program in environmental studies leading to a Bachelor degree; Norwich University, which offers a program in Engineering Technology (Environmental) leading to degrees of Master of Science and Bachelor of Engineering Technology; and the University of Vermont, which offers a Bachelor of Science degree in Environmental Studies.

SENIOR INSTITUTIONS

Marlboro College
Marlboro, Vermont

Program: Environmental Studies (B.S. or B.A.)

Hours required for Major: Semester equivalent - 120 credits
Program Inception: 1975
Staff Size: Eight instructors (8 Ph.D.)
Enrollment: 10
Graduates (1976): 0
Placement: 0
Graduate Work: 0

Courses

Course outlines are not available at this time. Materials are being prepared for inclusion in the Fall catalog; however, no materials have been prepared for official dissemination.

SENIOR INSTITUTIONS

Norwich University
Northfield, Vermont

Program: Engineering Technology (Environmental) (B.E.T., M.S.)

Hours required for major: Semester - (B.E.T.) - 126, (M.S.) 30
Program Inception: (B.E.T.) 1971, (M.S.) 1973
Staff Size: One associate professor, one assistant professor, one instructor (3 M.S.)
Enrollment: (B.E.T.) 47, (M.S.) 9
Graduates (1976): (B.E.T.) 11, (M.S.) 0
Placement: (B.E.T.) 15, (M.S.) 0
Graduate Work (M.S.): 3

Courses

Chemistry
Introduction to Engineering
Technical Math
Technical Calculus
Air Science
Statistics
Elementary Electric Circuits
Physics
Environmental Chemistry
Environmental Biology
Applied Thermodynamics
Mechanics of Materials
Technical Electronics
Instrument Laboratory
Environmental Pollution
Public Speaking
Fluid Flow
Meteorology
Air Pollution
Water Pollution Control
Water Analysis Instruments
Hydrology and Water Resources
Air Pollution Analysis Instruments
Air Sampling and Monitor
Air Field Laboratory
Water Field Lab
Sanitary Engineering
Advanced Sanitary Engineering
Environmental Sanitation
Water Resources

Advanced Water Resources
Construction Management
Advanced Project Economy
Computer Methods in Engineering Science
Ecology
Elements of Statistics
Business and Government
Public Finance
Collective Bargaining and Public Policy
Management of Business Organization
Personnel Management
Management Communications
The Legislative Process
Public Administration
State and Local Government
Business Policies & Contemporary Social Problems
Planning Seminar
Management Policy Decisions
National Resources Economics

SENIOR INSTITUTIONS

University of Vermont
Burlington, Vermont

Program: Environmental Studies Program (B.S.)

Hours required for major: Semester - 120
Program Inception: 1972
Staff Size: Two professors, two associate professors, two assistant professors (5 Ph.D., 1 M.S.). A part-time staff of approximately twenty professors from varied university programs provide additional instructional support.
Enrollment: 80
Graduates (1976): 20
Placement: 10
Graduate Work: 10

Courses

Introduction to Environmental Studies
Major Seminar in Environmental Studies
Environmental Theory
Environmental Practicum
Research Seminar
Senior Project and Thesis
Environmental Law: the Use of Land
Environmental Policy and Administration
Environmental Perception
The Ecology of Agriculture
What is Church Street?
Burlington 1984
Man & Environment: Which Way Vermont?
The Visual Environment
Visual Studies
General Ecology
Environmental Education
Community Design
Cultural Ecology
Man in Nature
Environmental Geology
Man/Environment History
Man and the Forest Environment
Environmental Policy
Regional Planning
Landscape Design
Environmental Psychology
Population, Environment, Society
Technology and the Environment
Environmental Biology

State Legislation

VERMONT GENERAL

TITLE:

Environmental Conservation Law
Vermont Statutes 3-2801

PURPOSE:

To provide a program of environmental coordination for the state and to create an agency of environmental conservation.

DEFINITIONS:

1. Agency
2. Department
3. Director
4. Division
5. Commissioner
6. Secretary

ADMINISTERING AUTHORITY:

Agency of Environmental Conservation

AUTHORIZATIONS:

To assume certain functions of the Department of Fish and Games, the Department of Forests and Parks, the Department of Water Resources, and other agencies;
To bring actions to enforce the act;
To issue regulations;
To coordinate environmental planning matters;
To supervise air, water, radiation, and solid waste pollution matters.

PROHIBITED ACTS:

To violate court orders issued under the act.

PENALTIES:

Fines of from $100 to $10,000.

VERMONT AIR

TITLE:

Air Pollution Control Law
Vermont Statutes 10-351

PURPOSE:

To provide for a coordinated statewide program of air pollution prevention, abatement and control, and to distribute responsibilities among the state governmental units to achieve such goal.

DEFINITIONS:

1. Agency
2. Air contaminant
3. Air pollution
4. Board
5. Emission
6. Person
7. Secretary

ADMINISTERING AUTHORITY:

Agency of Environmental Conservation
Air Pollution Control Section

AUTHORIZATIONS:

To act as a state lead agency in air pollution matters;
To issue regulations pursuant to the act;
To develop a comprehensive state plan for air pollution prevention;
To conduct studies relating to air pollution;
To establish ambient air quality standards;
To declare air pollution emergencies;
To grant variances under the act;
To provide for the regulation of motor vehicle emission;
To generally enforce the act.

PROHIBITED ACTS:

To violate any air pollution standard;
To fail to obey any emergency orders;
To violate the terms of any variance or permit;
To fail to maintain motor vehicle air pollution control devices.

EXEMPTIONS:

Air pollution or air contamination solely within a commercial or industrial plant.

PENALTIES:

Fines of up to $2,000.

VERMONT PESTICIDES

TITLE:

Pesticides Control Act
Vermont Statutes 6-1101

PURPOSE:

To provide for a program of pesticide control through the certification and licensing of pesticide applicators.

DEFINITIONS:

1. Commissioner
2. Cumulative
3. Economic poison
4. Pest
5. Pesticide

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Advisory Council

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To classify pesticides and restrict their usage;
To enforce the act;
To control the storage, transportation and disposal of pesticides;
To enter and inspect property in enforcement of the act;
To license pesticide dealers;
To establish applicator certification standards and certify private and commercial applicators;
To categorize commercial applicators;
To develop a state plan concerning pesticides;
To issue experimental use permits.

CERTIFICATION OR LICENSING:

All persons who apply pesticides must be licensed;
Oral or written examination required;
Eleven categories of applicators established by the act.

PROHIBITED ACTS:

To apply pesticides without proper license;
To violate the terms of any license;
To sell, use, store or dispose of economic poisons in violation of the act or regulations.

EXEMPTIONS:

Land owners using pesticides on own property.

PENALTIES:

Fines of up to $500.

VERMONT RADIATION

TITLE:

Radiation Protection Law
Vermont Statutes 18-2701

PURPOSE:

To establish standards for protection of the public from ionizing radiation hazards.

DEFINITIONS:

1. As low as reasonably achievable
2. Background radiation
3. Board
4. Curie
5. Dose
6. Individual
7. Unrestricted area
8. Ionizing radiation
9. Radioactive materials
10. Rem

ADMINISTERING AUTHORITY:

Board of Health
Department of Health

AUTHORIZATIONS:

To establish radiation exposure standards;
To enter and inspect property in enforcement of the act;
To register ionizing radiation sources;
To control transportation of radioactive materials.

PROHIBITED ACTS:

To fail to register ionizing radiation sources;
To violate radiation exposure standards;
To violate board orders;
To install or use X-ray shoefitting devices.

EXEMPTIONS:

Low-level radiation sources, electrical equipment not intended to produce radiation, and others by regulation.

PENALTIES:

NRC AGREEMENT STATE: No

VERMONT SOLID WASTE

TITLE:

Beverage Container Law
Vermont Statutes 10-1521

PURPOSE:

To limit solid waste disposal problems through a program of beverage container deposits.

DEFINITIONS:

1. Beverage
2. Biodegradable material
3. Container
4. Distributor
5. Manufacturer
6. Recycling
7. Redemption center
8. Refillable
9. Secretary

ADMINISTERING AUTHORITY:

Agency of Environmental Conservation

AUTHORIZATIONS:

To impose a levy on beverage containers;
To approve redemption centers;
To develop educational information concerning the act;
To issue regulations pursuant to the act.

PROHIBITED ACTS:

To sell beverage containers part of which is detachable in opening;
To sell beverage containers with non-biodegradable connecting devices;
To refuse to redeem beverage containers with refund value;
To sell beverage containers with a refund value of less than five cents.

PENALTIES:

Fines of up to $1,000.

VERMONT SOLID WASTE

TITLE:

Rubbish and Garbage Law
Vermont Statutes 24-2201

PURPOSE:

To control solid waste collection and disposal and to encourage the development of recycling centers.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Agency of Environmental Conservation
Local Governmental Units

AUTHORIZATIONS:

To develop a state plan for solid waste recycling;
To establish and maintain solid waste recycling centers;
To issue regulations pursuant to the act;
To establish and maintain local sanitary landfills;
To establish local garbage and refuse rules.

PROHIBITED ACTS:

To dump or deposit garbage or other solid wastes within 300 feet of another person's property;
To deposit garbage or other solid waste into state waters;
For local governments to fail to provide sanitary landfill;
To dispose of solid wastes from outside the state.

EXEMPTIONS:

Prior agreements or reciprocal agreements relating to out-of-state waste;
Open dumps may be permitted depending on cost and appearance factors.

PENALTIES:

Individuals - fines of up to $500 or ten days in jail;
Municipalities - fines of up to $100.

VERMONT WASTE WATER

TITLE:

Water Pollution Control Law
Vermont Statutes 10-1251

PURPOSE:

To classify the waters of the state and to control and abate water pollution.

DEFINITIONS:

1. Board
2. Department
3. Discharge
4. Person
5. Public interest
6. Waste
7. Waters
8. Effluent limitation
9. Schedule of compliance
10. Secretary
11. Oil
12. Hazardous materials

ADMINISTERING AUTHORITY:

Department of Water Resources
Water Resources Board

AUTHORIZATIONS:

To classify waters of the state according to the degree of water quality;
To supervise the management of waters of the state;
To administer the state pollutant discharge permit program;
To issue regulations relating to handling, storage and transport of oil and other hazardous materials;
To develop a statewide contingency plan relating to water cleanup operations;
To enforce all provisions of the act.

PROHIBITED ACTS:

To cause or allow discharge into waters of the state without a permit;
To violate the terms of any permit;
To violate any regulations relating to oil or hazardous materials;
To deposit any sawmill refuse into waters of the state.

PENALTIES:

Criminal - fines of up to $25,000 or six months imprisonment;
Civil - fines of up to $10,000 per day;
Sawmill refuse violations - fines of up to $100.